

→ ADVENTURE SPECIAL ISSUE

# CYCLE WORLD

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ADV RIDING TIPS

**SUPERBIKE  
MEETS  
ADV**

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## 2016 BMW S1000XR

BMW TAKES ON **KTM 1290 SUPER ADV**,  
**KAWASAKI VERSYS 1000LT**, AND  
**DUCATI MULTISTRADA 1200S**

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NOVEMBER 2015 CYCLEWORLD.COM





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Photo by Jeff Allen.

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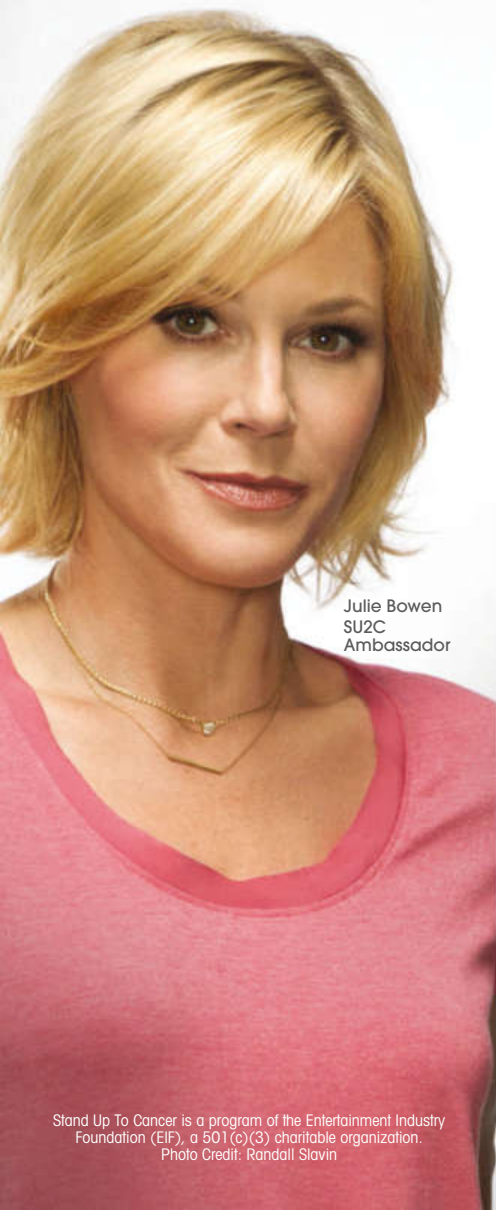
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# AN OILY, FRACTURED JOURNEY

A NEW CHAPTER IN THE SAGA OF A BRITISH SINGLE?

**H**ow many pistons per service interval should a motorcycle require? Does anybody but me and a Facebook friend poking fun at me for having the head of my 1954 Velocette MSS off again even know what a “de-coke” service is?

These are rhetorical questions. British bikes challenge our perseverance and skills on the road and in the shop. I’d be lying if I said I didn’t like it.

As I have chronicled in these pages before, the 50 years my MSS was on the road before I got it in 2004 appears to have been hard on the old thing. When I bought it while visiting friends near Christchurch, New Zealand, circa 2004, it clearly had a hell of a rod knock but was irresistibly shiny and had beautiful lines. Plus, it had a rare Alfin aluminum cylinder and a Venom head (higher performance than the stock MSS). I commissioned an engine rebuild down there with the plan to return when it was complete to make a weeklong tour of the South Island, one of the greatest places to ride a motorbike in the world.

I did that ride, and the bike seized late one pleasant sunny afternoon. Not a thrilling outcome on our first big trip, but the engine was freshly redone and perhaps not fully broken in. It hadn’t stuck badly, and I limped it into the next town where we retimed the spark (just to be sure) and carried on.

Back home, I was graced with a noisy piston, so I resolved to educate myself in the ways of Velo. Whee! So it began.

There is too much go over in all of my engine trials through the years, but as of right now, every major part and many minor parts on the engine have been replaced. The last and most profound was the cracked MSS cases, which had led to about two years of dormancy

under a dark sheet in a dark corner of the garage. For the bike, I mean.

It terrifies me to even think this, much less utter it aloud or, ye gods, type it here, but I have not had one whit of trouble with the gearbox. Not a drip of oil, never a missed shift. I shall now forever hear noises from the gearbox and have nightmares for the curse I have just unleashed... But, seriously, the gearbox is magic on this bike.

Through it all, I have never been towed to my destination. Sure, I’ve had a few unplanned “rest periods,” but we always got going again. Over the years, the MSS has ably carried me up the California coast from LA to Monterey on Highway 1 a few times, and I rode it home from Sonoma following a press event where I left behind a brand-new luxury touring bike to use the MSS. It has lapped Laguna Seca and served as daily transportation during “The Month of Velo” where I rode it and only it everywhere I needed to go. I couldn’t ride with the club at the Velo rally this year, so I did a Week of Velo to ride along in spirit as I went about my daily life.

The past few weeks, I’ve had the engine apart after a year of good behavior to work on reducing some oil leaks. The insides were pristine. The bore was perfect and the valve guides showed zero wear. Honestly, it was weird... Hoping for success in slowing the egress of oil (we must try), and I’ve also dialed back my quest for ultimate velocity.

Besides, how fast can you go with a 1950s Swallow Jet 80 sidecar attached to one of these things? I’m not sure yet, but I’ll save the outcome of story for the next round.

**MARK HOYER**  
EDITOR-IN-CHIEF



## THIS MONTH'S STATS



zero

NUMBER OF PISTONS  
CONSUMED IN THE  
PAST 12 MONTHS

115°

HOTTEST RIDING  
DAY IN FAHRENHEIT  
ENCOUNTERED IN  
TESTING

10.2

SECONDS THE  
BMW S1000XR TOOK  
IN THE QUARTER MILE





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# Intake

KICKSTART THE CONVERSATION



Enjoyed the “Turn & Burn II” comparo article. Einstein theorized that time actually slows down as a body approaches the speed of light. Assuming he was correct, if I ride my H2 at very high speeds, will I live forever?

MARK FINKLER  
CYCLEWORLD.COM

No, you'll run out of gas, but you'll feel great until then.

This often leads to confusion, eh? On the other hand, thanks for considering the weight of a rider in your numbers (about 195 pounds?).

CHRISTOPHER LASCOUTX  
CYCLEWORLD.COM

Hoyer wishes.

## FROM A (HAND)BUILDER

I just read the comment from Dave Rogers in your October “Intake” page about the bikes at The Handbuilt Show in Austin (August). He stated that they are “cobbled together, cartoonish, and unrideable machines.” It’s sad that he can’t appreciate what we are doing. It is my “Twin-Scout” dual-engined custom that CW graciously put on the cover. I am an avid motorcyclist, with 27 bikes of all kinds. I am also a Bonneville land speed racer and custom builder with many Best of Show awards. Building custom bikes is my way of expressing myself artistically. To people like me, it is far more rewarding to go out and ride your art than to just admire a painting on a wall.

As for “cobbled, and unrideable machines,” my Twin-Scout is licensed, insured, and street legal. It was one of the most dramatic examples of a hand-built bike at that show, but it is actually quite rideable. I put in over 700 street miles developing the bike for salt flat racing before putting it on the salt. The testing paid out, because it has already set four world land speed records so far (CW incorrectly said two) and it would be eight by now if the meets hadn’t been canceled this year. It is always fun for me to see the expressions on people’s faces, when they look over my customs. It makes it all worthwhile!

JIM MOSHER  
SANTA FE, NM

## PERFORMANCE VS. DOLLAR

BMW must be thrilled its S1000RR performed so well in your recent “Turn & Burn II” article. Perhaps besides rating bikes with a power/weight ratio, a new rating should be added: performance/dollar. The \$15K BMW was the clear winner here compared to the three other bikes, one priced at \$22K and the others are \$25K!

JOHN LOCKWOOD  
BLAIRSVILLE, GA

## AND...KUDOS

Kudos to Kawasaki for building the H2R. I just don’t think it should have been named the “Best Superbike” because it’s not street legal and was a no-show at the 0-180-mph shootout.

BRUCE KASTEL  
CYCLEWORLD.COM

## ELEVEN BEST BIKES?

Excellent write-up on the Ten Best Bikes (September). I’m certain there was unanimous agreement among the staff for most of the choices. Best Superbike:

Kawasaki H2R, of course. Best Open-Class Streetbike: Yamaha YZF-R1M, a shoo-in! And the KTM 1290 Super Adventure I’m sure was the uncontested choice for Best Adventure Bike. However, don’t tell me there wasn’t much “wailing and gnashing of teeth” over your Best Touring Bike selection, the Ducati Multistrada 1200S. I’m thinking to avoid such strife, you need two touring categories: “Extended weekend” touring and “Iron Butt Rally” level touring. Because of course, the Ducati is best suited for the former, not the latter.

JON COSTA  
MARTINEZ, CA

## WEIGHT, WHAT DID WE SAY?

I would like to order up one of those bikes with “a fabulous power-to-weight ratio of around 3.4 hp per pound” (“The Limits of Acceleration,” September). A 150-pound bike with 500 hp would be fine. Unfortunately a correct figure for power-to-weight is usually a decimal (0.294 hp per pound in this case). Rather awkward, so even though we call it power-to-weight it is really weight-to-power, also awkward.



Comments? Suggestions? Criticisms?  
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# Ignition

THE RIDE STARTS HERE

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#### THREE FLAVORS:

Suzuki offers the GSX-S1000 naked with/without ABS, while the fully faired GSX-S1000F comes with ABS as standard equipment.

BY THE NUMBERS

# K5

**2005:** The long-stroke GSX-R1000 remains a favorite with many Gixxer fans for its meaty midrange delivery.

# 139

**HUNDRED DOLLARS:** Price difference between base model GSX-S1000 and 2015 GSX-R1000.

CW FIRST RIDE

## 2016 SUZUKI GSX-S1000

A naked, friendly, and affordable GSX-R By Don Canet

**N**ow celebrating its 30th anniversary, Suzuki's GSX-R supersports have fulfilled the sporting ambitions of multiple generations of enthusiasts. As a guy who owned and raced the original GSX-R750 when it was introduced to the States in 1986, I now fit the target demographic of the all-new GSX-S models with their upright ergonomics.

At the core of the 2016 lineup of Suzuki GSX-S1000 models—which includes a naked (with ABS option) and a faired ABS-equipped F version—is the 2005 GSX-R engine. This is the much-lauded 999cc long-stroke inline-four, which has better midrange torque than more recent Gixxers. Revised ports, cam timing, and lobe profiles all further conspire to boost low- to midrange torque delivery. The 44mm SDTV throttle bodies are those of the GSX-R, while stainless-steel valves of the same diameter have replaced the titanium ones of the GSX-R. The six-speed gearbox has identical ratios, but two teeth have been added to the rear sprocket for lower overall gearing. A conventional clutch has replaced R's slipper/assist unit.

On the CW dyno we saw 138 peak horsepower at the rear wheel, at 11,280 rpm. Torque is good, with a 74 pound-feet arriving at 9,250 rpm. The gains lower in the rev range do come at the expense of top-end production, as evidenced by a 2,000-rpm-lower redline, which is now at 11,500. The overall result? This is a smooth-running tractor of a motor that offers

steady roll-on response from as low as 1,500 in top gear. Stoplight departures are a snap, and slick shift action means the bike reaches speed in fluid fashion.

Engine vibes remain subdued until the LCD tachometer passes 6,000 rpm, where a tolerable buzz builds in the taper-style Renthal Fatbar. Freeway cruise is pleasant enough, with the engine turning 5,500 rpm at an indicated 80 mph on the compact all-digital dash.

At the press ride, which was held in Monterey, California, I experienced all-day comfort in the deeply padded saddle. As I rode north to the famed Alice's Restaurant nestled in the coastal mountains, I found the riding position roomy on droning stretches of highway yet with enough of a sporting posture for some good fun while hustling the bike along the twisty redwood-lined back roads. I spent equal time on both models and can confirm that no ergonomic difference exists between them, aside from the F's

**YOSH BITS:**  
Aftermarket accessories abound.







added wind protection.

As the second Suzuki model to feature traction control, the GSX-S utilizes the same left bar-mount switch array introduced on the current V-Strom 1000. The system offers three levels of TC sensitivity, and the calibration is sportier than on the big Strom. The rider can switch among the settings or even turn TC off while riding. Level 3, intended for wet conditions, saw the yellow status light on the dash signal ignition retard intervention under modest acceleration on the dry road. It took some serious cornering effort to trip TC in the normal setting, and Level 1 seems like it will prove useful at an aggressive trackday pace. Turning the TC off allowed for unadulterated wheelie antics with a snap of throttle in the bottom two gears.

The presence of GSX-R-style aluminum footpegs with no rubber damping hints at the S's sporting intent. In fact, its twin-spar main frame is said to be lighter than that of the GSX-R, and its gull-

style swingarm is that of the R. With a claimed curb weight (with 4.5-gallon tank full) of 456 pounds for the naked (add 5 pounds for ABS) and 472 pounds for the F, both flavors of GSX-S are featherweights of the category.

The fully adjustable 43mm KYB inverted fork appears to have been lifted from the 2005 Gixxer parts bin, providing firm sporting performance and excellent feedback and feel when attacking an apex. The shock has provisions for preload and rebound-damping adjustment. Steering was light and neutral, while overall stability proved excellent, even when I rode the Suzuki at a swift pace on the bump-strewn Highway 236 out of Big Basin Redwoods State Park.

I never encountered a lack of cornering clearance on either bike, and braking performance was excellent. The Brembo monoblock four-piston front calipers biting on 320mm rotors provided strong, consistent power and very good feel at the lever. While the Bosch



ABS cannot be turned off, I didn't feel a need to do so because the system performed well in a sport-riding role.

Perhaps the best news for an old Gixxer guy such as myself is price. The 2016 Suzuki GSX-S1000 will set the retirement savings back only \$9,999 when bikes arrive at dealers in late August. For another \$500, ABS is a wise investment for aging reflexes. The tough part is deciding between the naked or the \$10,999 GSX-S1000F.

Just like at Alice's Restaurant, these two new Suzukis allow you to get anything you want... **CW**

**THIS IS THE MUCH-LAUDED 999CC LONG-STROKE INLINE-FOUR, WHICH HAS BETTER MIDRANGE TORQUE THAN MORE RECENT GIXXERS.**

## 2016 SUZUKI GSX-S1000

### ENGINE TYPE

DOHC inline-4

### DISPLACEMENT

999cc

### SEAT HEIGHT

31.8 in.

### FUEL CAPACITY

4.4 gal.

### CLAIMED WEIGHT

456 lb.

### BASE PRICE

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**CW FIRST RIDE**

# 2016 VICTORY EMPULSE TT

A Brammo by any other name **By Mark Hoyer**

**T**he story of this 2016 electric motorcycle isn't really about 2016, and it's really not that much about the actual motorcycle. It's about long-term positioning for 2020 and beyond—and Victory's parent company Polaris being

prepared to place strong bets on transportation segments it believes will pay off. Electric motorcycles will have a place in many mass markets, and this bike says, "We will be there. We are there."

The bike is the 2016 Victory

Empulse TT, and if it looks familiar, that's because it's a lightly modified Brammo. Cosmetics are polished, a new instrument unit is used, paint and bodywork are redone, and battery capacity is boosted 10 percent with new "pouch" cells



## SPECS

### 2016 VICTORY EMPULSE TT

#### PRICE:

\$19,995

#### MOTOR TYPE:

Internal, permanent-magnet AC

#### CLAIMED OUTPUT:

54 hp

#### SEAT HEIGHT:

31.5 in.

#### CLAIMED WEIGHT:

470 lb.

# 10

Percent increase in battery capacity through improved packaging over the previous bike's

# 109 mph

Top speed indicated at the end of High Plains Raceway's longest straight. It went down as motor/battery heat increased.

Victory put much polish on the Empulse TT's aesthetics, with better paint, nicer gauge package, and improved bodywork.

and more efficient packaging. It's even initially being manufactured by Brammo in Oregon before production is later moved to the Midwest.

And the Empulse name is Victory's full acknowledgement of this bike's technical origin. What the Empulse TT accomplishes is this: It gets Victory entry into the electric market before any major OE—particularly Harley-Davidson—and it helps reposition Victory as a forward-looking, performance-oriented brand. It also allowed the company to race the ex-Brammo electric superbike in the 2015 Isle of Man TT (where it finished third in the hands of Lee Johnston), while fitting in nicely with the “prove American performance” efforts represented by the Project 156 Pikes Peak racer and the Gunner Pro Stock dragbike.

It's no surprise the riding experience of the 2016 Victory Empulse TT is almost exactly the same as the Brammo version. In my first laps at High Plains Raceway east of Denver during the press launch, the biggest functional improvement was clear: A narrower rear tire on these new Victory-sourced rims made steering lighter and more neutral. It also showed the seat is much improved over the very poor Brammo piece.

Riding a street pace on this

racetrack demonstrated this is a reasonably comfortable, small-feeling bike with acceleration performance not quite in the Suzuki SV650 range from its electric motor and six-speed gearbox. The last Empulse we tested made 52.4 hp and 62.6 pound-feet of torque on our dyno.

The 10.4-kWh lithium-ion battery is better packaged and offers 10 percent more capacity, according to Victory. In our last Brammo test, we found the practical average range to be 45 miles in normal suburban riding, so we'd expect that to be perhaps 50 with the added capacity. Full charge time on 110-volt household current is seven to eight hours; at 240 volts on a public charging station or with accessory charger this is reduced to 3.5 hours.

The gearbox, clutch, and chain final drive didn't make sense before and still don't. It makes the bike noisier than it needs to be, adds significant driveline lash, and complicates the riding experience for no real benefit. I left it in third or fourth gear and skipped the clutch altogether.

The faster I went around High Plains Raceway, the more it showed that the suspension is unchanged from Brammo spec in the general lack of damping control. Given Victory's success with damping settings

and chassis behavior in its gasoline motorcycles, leaving this stuff unimproved is a disappointment.

So? Polaris gets credit for being the first big bike maker to offer an electric streetbike and gets to see if its supposed customer—a “status-driven, tech-savvy, thrill-seeking ‘toy’ collector, a Tony Stark-type guy”—is actually out there and willing to spend money on a bike like this. We are far more interested to see the next electric motorcycle from Victory. Earlier this year Polaris registered the name “Victory Charger.” What does this prove? That Polaris is serious about bringing its formidable industrial design capability and decade and a half of motorcycling building experience into the electric market. *CW*





# — 2016 GSX-S1000 ABS —

## *Machina Nudus*



### PRIMARY CHARACTERISTICS

*Fig. A – Three-mode Traction Control for any riding condition*

*Fig. B – Engine developed from 30 years of GSX-R performance*

*Fig. C – Powerful Brembo brakes with available ABS*

### GENUS GIXXUS



*GSX-S1000*



*GSX-S1000 ABS*



*GSX-S1000F ABS*



— 2016 GSX-S1000F ABS —

## *Machina Non-Nudus*



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CW FIRST RIDE

# VICTORY ISLE OF MAN TT ELECTRIC SUPERBIKE

A few laps in the USA on Victory's ex-Brammo electric superbike  
By Mark Hoyer

**T**hree laps on a track you just met isn't much time to explore the performance of an Isle of Man TT electric superbike, but I have to say Lee Johnston's third-place machine—run by Victory and the Brammo crew at the Island this past June—made it exceptionally easy to go as fast as I could, so to speak.

Such is the glory of a well-set-up racing motorcycle. Well, that and the fact that there is no gearshifting or clutching required on this single-speed electric machine. Like the best new gasoline superbikes that offer auto-blip, no-clutch downshifts, this electric

TT racer allows the rider to fully concentrate on braking and steering during corner entry, freeing

up loads of brain power normally lost on trying to clutch and blip the throttle smoothly.

And “throttle” response (shall we call it a “torque selector”?) was linear and easy to manage. I remarked later to Johnston that I kept wanting to feed power in earlier and earlier, but he offered words of caution: “The thing can give you a wicked highside because the torque can make it break away so quickly.”

Testing location was High Plains Raceway east of Denver, a track with lots of elevation changes and plenty of bumps. No surprise this TT real-roads racer was a grippy magic carpet ride (thanks, K-Tech/Ohlins) given the speeds and road conditions at the Isle of Man.

It added to the overall serenity of this quiet, eerily smooth superbike. I've never had so much braking feedback get through. It was like I could feel the pad molecules vibrating on the discs.

The bike later was run at a dragstrip by Lee Johnston himself, and it clicked off a mid-10-second run at about 140 mph. Not bad for an EV with one gear. I reached about the same peak speed I reached on the track's longest straight.

Track performance felt comparable to that of a modern internal-combustion street-legal superbike without all the commotion. There is plenty left to be done in the development of electric technology, but for three laps this bike was fun to ride fast. **CW**

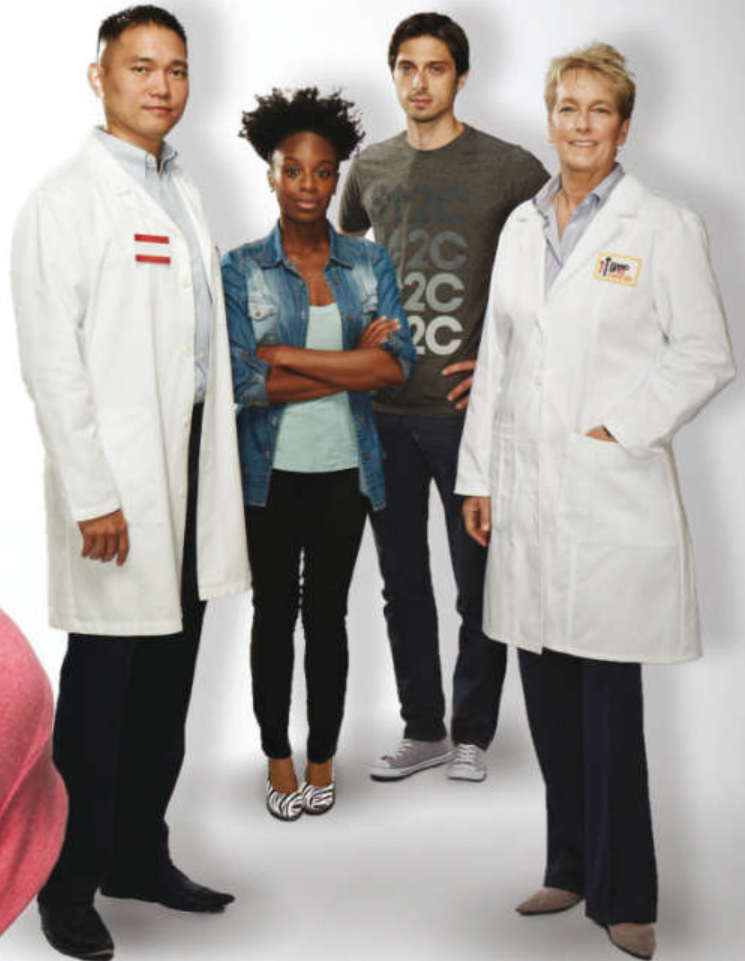


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SU2C Ambassador



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Stand Up To Cancer is a program of the Entertainment Industry Foundation (EIF), a 501(c)(3) charitable organization.  
Photo Credit: Randall Slavin



## AIR TALK

Dainese's D-air racing airbag suit is finally available in US  
**By Blake Conner**

→ It's impossible to talk about Dainese without recognizing its impact on the market. The list of "market firsts" for the Italian motorcycle apparel company is impressive. It includes colored leathers, the back protector, knee sliders, the aerodynamic hump, carbon-/titanium-protected gloves, biaxial boots, and now the wireless airbag racing suit.

Observant readers will note that MotoGP racers have been wearing airbag suits since 2007, with the first deployment in competition occurring that year at the Valencia GP. D-air has been available in Europe since 2011 and was certified by Germany's very stringent TUV product testing agency in '10.

So why has it taken so long for D-air to come to market in the US? The short answer: There are different standards for electronic devices in the US, namely FCC and UL requirements. Now, with those hurdles finally cleared, two products are ready for sale: the Misano cowhide-racing suit (\$2,499) and the custom-order kangaroo-hide Mugello (starting at around \$4,000).

D-air's brain resides in the suit's back hump. Seven sensors, including three accelerometers, three gyroscopes, a GPS receiver, and 2GB of internal memory and a lithium-ion battery are packed into the compartment.

While the hardware is special, the key to the racing suit's effectiveness are algorithms written into the software. Because repacking/rearming the suit requires sending it back to Dainese, you don't want the airbag deploying unless it is absolutely necessary. This means there are certain situations in which the suit will not deploy. Right now, only a D-air racing suit (intended for track use) is available, but a street version is currently undergoing



D-AIR'S BRAIN RESIDES IN THE SUIT'S BACK HUMP. SEVEN SENSORS, INCLUDING THREE ACCELEROMETERS, THREE GYROSCOPES, A GPS RECEIVER, AND 2GB OF INTERNAL MEMORY AND A LITHIUM-ION BATTERY ARE PACKED INTO THE COMPARTMENT.

certification. At speeds below 31 mph, the airbag won't deploy, and it can also detect how you are crashing. In other words, it will deploy for a highside or lowside in which there is tumbling but not a simple slide on your backside. When the sensors determine a crash is imminent, it triggers the Cool Gas Generator, which deploys the 4-liter airbag to protect the

shoulders and collarbones in just 30 milliseconds (about a tenth of the time it takes to blink your eye). It then stays firmly inflated for about five seconds and deflates completely in about 30.

Proof of D-air's effectiveness? Since 2009, only one MotoGP rider wearing the suit has fractured a collarbone, while riders not wearing D-air have suffered 52. **CW**



## NOVEMBER 1990



→ A hot issue! Hot pink, that is. But the bikes were also hot: "Built for Speed II" lined up five hopped-up musclebikes in a big performance shootout. Jay Gleason, all 135 pounds of him, ripped the bikes through the quarter mile, while legend Don Vesco ran them for ultimate top speed. The Vance & Hines Yamaha FZR1000 and Yoshimura Suzuki GSX-R1100 were naturally aspirated, Fours N' More's GSX-R1100 and NOS Systems' Honda Hurricane were running nitrous, and Mr. Turbo's Suzuki Katana 1100 ran, what else, a turbo. The Yoshimura bike sprinted

a 9.77-second 145.39 mph to rule the strip, while the NOS Honda hit a 174-mph top speed. Amazing numbers back then, but now you can just see your local dealer and save the nitrous for parties.

→ The Headline of the Issue award goes to "Berms of Endearment," a story of editor Ron Lawson and his ATK 604 thumper project bike. He ran it as a moto, enduro, and dual-sport machine in the year he worked on it. Interesting note: The rear brake is mounted on the countershaft and, said Lawson, it either didn't work

or would get so hot it locked. He loved the electric start. Except when the bike would start itself after he closed the garage door...

→ Finally, the Vintage Rockers Cycle Club, a small band of Ace café-inspired riders from Santa Cruz, California, was the springboard for a piece on Rocker culture being reborn in America. Which stands as proof that café culture never really dies but simply gets reborn by the next generation of enthusiasts. Been watching the custom scene in 2015?

—Mark Hoyer

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CHAMP  
ON  
MOTO2

**moto2**

### PAYING THE DUES

→ Rabat, 26, spent five seasons in 125cc Grand Prix before moving to Moto2 in 2011. He finished 10th, seventh, and third overall prior to topping the intermediate class.



### WINNING FORMULA

→ Barcelona-born Rabat won seven races and scored a record number of points—346—en route to winning the Moto2 world title.

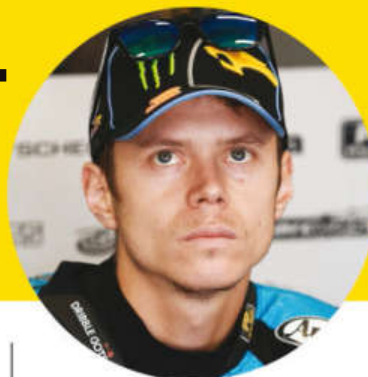
### NUMBER 1 ON THE FRONT

→ Rabat is the first Moto2 champ to defend his title. Previous winners Toni Elias (2010), Stefan Bradl (2011), Marc Marquez (2012), and Pol Espargaró (2013) moved to MotoGP.

### ON THE RECORD

# ESTEVE “TITO” RABAT 2014 MOTO2 WORLD CHAMPION

Team Estrella Galicia 0,0 Marc VDS rider has future aspirations in MotoGP **By Matthew Miles**



#### → MOTO2 IS VERY COMPETITIVE.

Everyone has the same engine, same tires, same weight. The difference is the way the rider works with the team. You must have a good team that prepares the bike well. You have to know the team, and they have to know you.

#### → THIS CLASS IS A GOOD SCHOOL TO LEARN

how to manage the tire. If you ride harder—brake later and slide at the exit—you damage the tire. You have to learn to pick up the bike and brake a little more smoothly.

#### → THIS YEAR, EXCEPT FOR ONE RACE,

Jerez, the tires have shown good performance from the first lap to

the last lap. That is better than last year and the year before. The quality for race distance is better.

#### → THE MOTO2 RIDING STYLE IS COMPLETELY

different from Superbike or Supersport. I know because I used to practice on a Honda CBR600RR. Moto2 is a racebike—more precise. You have to take time to learn that. It's hard work, but this is the world championship and that is the reason the level is so high.

#### → IN MOTOGP, YOU HAVE TO BE A VERY

good rider and show your aptitude. If you have the best bike, your job is to finish first. Racing is hard. And every year, it will be harder.

#### → MY DREAM IS TO GO TO MOTOGP.

I stayed one more year in Moto2 because I am in a good team with a good bike. When you feel these conditions, you bring more power than when you are in the wrong team.

#### → IN MOTOGP, MARC MARQUEZ IS VERY

hard on the tire. Valentino Rossi is smoother. Jorge Lorenzo also looks smooth. But they know how to manage the tire from years of experience.

#### → WINNING RACES IN MOTOGP IS

hard but not impossible. **CW**

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NEW IDEAS

# ADV GEAR BAG

Five new products for getting off the beaten path **By Blake Conner**



1

## JOINT CARE

If you've ever had knee issues, or surgery to repair a knee, you don't ever want to go through that again. Knee braces such as **EVS Sports' Web Pro** (\$425) could provide peace of mind when riding off-road, MX, and ADV bikes. The braces feature twin-wall c-f frames, Tru-motion 3.0 anatomically correct hinges, and adjustable hyperextension lockouts. → (310) 637-5000 [evs-sports.com](http://evs-sports.com)

2

## SEE THE DIRT

Adventure-touring riders who hit the dirt depend on goggles in the dust. The Italian-made **Ariete Riding Crows Pro Top goggles** (\$68.36-\$72.86) feature anti-scratch, UV-protection lenses in multiple tints; roll-off and tear-off lenses are also available. The double-buckle adjustment strap has a silicone bead to prevent slippage on helmet. → (888) 691-9378 [mx1west.com](http://mx1west.com)

3

## LUXURY DUDS

Ever been caught in torrential rain with vented gear? Ever been caught in blistering heat wearing leather? Both make a strong argument for a suit like **Klim's Badlands jacket** (\$949.99-\$999.99) and **pants** (\$649.99-\$669.99). The Gore-Tex three-layer Pro shell is guaranteed to keep you dry, while new vents flow more air for hot-weather riding. → (208) 552-7433 [klim.com](http://klim.com)

4

## REALITY RIDING

Prove how gnarly your ride was by documenting it on a POV camera. **GoPro's Hero4 Session** (\$399.99) is the lightest/smallest camera it has ever made. Highlights: single-button recording, waterproof to 33 feet (without a housing), two-hour recording time, up to 1440p 30fps capture, 8mp photo capture, and a variety of low-profile mounts. → (888) 600-4659 [gopro.com](http://gopro.com)

5

## HANDLEBAR HELPER

Versatile gloves are a must for ADV riding. You want protection for the asphalt but comfort and ventilation off road. **The Racer Rally glove** (\$79.99) has mesh uppers, goatskin palms, and knuckle protectors. Index and thumbs have Touch Tec material for touchscreen use. Velcro wrist closure secures the Rally. Available in sizes S to 3XL. → (408) 852-0700 [racerglovesusa.com](http://racerglovesusa.com)

## CW EVALUATION

# ALTRIDER HEMISPHERE SOFT PANNIERS

An alternative to expensive (and destructible) OEM hard saddlebags By **Blake Conner**



## ALTRIDER HEMISPHERE SOFT PANNIERS

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### UPS

- + Very lightweight and slim
- + Weather- and dust-proof
- + Functional and well designed

### DOWNS

- Can't lock them
- Accessing contents takes a bit longer
- No way to lock them to the bike

If you're an adventure-touring rider, you almost certainly have saddlebags on your machine. Bags come in a few flavors: OEM hard cases, aftermarket hard cases, and aftermarket soft bags. If there is one thing we've learned over the past couple of years piling up miles on our long-term ADV bikes, it's that Mother Earth likes to eat OEM hard bags for lunch.

As a matter of fact, we've destroyed a ridiculous number of accessory bags in recent years, so we were looking for an alternative solution. After receiving a set of AltRider's Hemisphere Soft Panniers for our long-term KTM 1190 Adventure R last year, we were impressed. So when BMW didn't have hard cases for our S1000XR testbike (see page 36), we mounted the Hemisphere


bags. The XR's luggage racks meant installation of the bags took minutes, and they fit perfectly using five mounting straps.

Constructed from ballistic nylon, each side bag has two compartments: an open holster-like top section that accommodates a 34-liter water- and dust-proof dry bag that clips in and is then further secured by a strap over the top. Below is a smaller cubby in which another 15-liter dry bag resides. An additional 28-liter dry bag can also be attached up top via metal cam-lock buckles (converts to a backpack), giving the entire system 126 liters of storage.

The beauty of the panniers is that they are very light and narrow. Even when loaded, the bags are barely noticeable to the rider, offering very little aerodynamic drag and

not upsetting the chassis balance with too much rear-biased weight. The tape-sealed seams of the dry bags work as advertised and kept the contents totally dry during a torrential desert thunderstorm.

Of course, this style of bag comes with a few compromises. First, you can't lock them. And when you need to grab something out of one on the road, it takes an extra step or two to access the contents. That said, pulling out the liner at your destination takes no more time than with any other bag on the market.

They might not be the best solution for everyone, but in our opinion the Hemisphere's affordable price tag, rugged construction, excellent functionality, and slim and light design make them an excellent choice for ADV exploring. 



RIDING TIPS

# ADVENTURE ROAD

Techniques to improve your off-road ADV experience **By John L. Stein**



**A**dventure bikes are to touring as SuperSTOLs or floatplanes are to aviation—they open up a whole new world, letting you explore where Gold Wings and Road Kings cannot. But riding big ADV bikes safely off the beaten track is a voodoo science, marrying the terrain reading of an off-road rider with the balance of a tightrope walker. Simply put, the über-weight, high center of mass, and bulkiness of adventure bikes are the opposite of what you'd want off road.

As such, off-roading a big ADV requires a thoughtful approach, some specific skills, and planning for trouble when you're far from help. Particularly, learn to pick up a heavy bike by yourself (position your back against the seat, grasp the lower handgrip and seat, and lift with your legs). Then think ahead to master

disaster. Cell phones often don't work in the outback, and the old practices of screaming for help, lighting a signal fire, flashing a mirror at aircraft, or simply waiting for another vehicle to arrive are actually rather iffy propositions if you or your bike get seriously disabled. Way smarter is a SPOT satellite transceiver (\$120 to \$550, [findmespot.com](http://findmespot.com)) that transmits your location and lets you connect with family, friends, or emergency services anywhere you go.

Here are four other techniques to improve your off-road ADV experience:

**1. Lower the weight.** If the nearly 600-pound curb weight were not enough, stuff another 60 pounds into the side cases and trunk and you'll be perched atop a high-centered hippo off road. Carry only what you need, and pack the heavy stuff low down.

**2. Read the terrain.** Single-tracks, sand, mud, and rocks present real challenges for adventure bikes. Bodywork interrupts your line of sight, mega-mass is ponderous, and DOT tires don't grip like knobbies. Continually scan the terrain ahead, and choose the smoothest lines.

**3. Practice braking.** Safely test for dirt grip by pulling the clutch in and applying the rear brake until the wheel locks briefly. Also, not all ABS works identically off road; test to determine whether "on" or "off" works best for the conditions.

**4. Jumping Jack Flash.** An 800cc to 1,200cc adventure bike is bigger, wider, and a bunch heavier than a CRF250L. So before your first tip-over, lay that pig over and see which parts are likely to pin you down. Then learn to stay clear. **CW**



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# STEALING FROM THE BEST

FACTORIES ARE PEEKING OVER CUSTOM BUILDERS' SHOULDERS **BY PAUL D'ORLEANS**



**A**mong the curious anomalies of the moment we live in, bike-wise, is the outreach of OEM factories to small "alternative custom" shops for inspiration. Observers with a negative bent call it poaching. Factories call it market research. Let's call it externalized R&D. It's a desperate attempt to find a hook into youth culture, a necessary job at which moto-management has been failing spectacularly for years: discovering styles and trends to which aspiring riders will respond. It seems when young people no longer find motorcycles sexy or socially dangerous or edgy, they no longer want to become motorcyclists. As a consequence, the average age of riders goes up. A typical Sturgis Rally participant is fiftysomething, which I reckon is the same for every traditional motorcycle event. I just finished a weeklong Velocette rally, and at 52, I was the youngest thumper in the Oregon woods. "Vintage" is supposed to refer to the bikes!

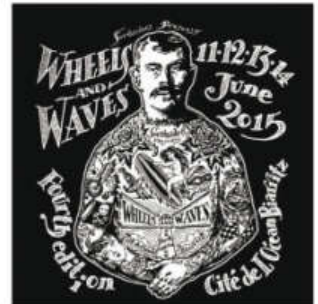
By contrast, the Alt.Custom scene seems to have snagged a generation of screen-gazers and spawned events like Wheels & Waves, Dirt Quake, and the Handbuilt Show, which have an average attendee age of 30-ish. To the industry, the freakbikes are beside the point; what matters is that young people, and most importantly non-riders, are hanging out at motorcycle events. Independent shops and shows have succeeded in making motorcycling look fun, cool, and hip again, and the industry knows it needs to get involved. Thus the Leviathan shakes off its slumber, and corporate sponsorship of the Alt.Custom scene is growing exponentially, as factories attempt to lasso this youth-culture comet.

The OEMs are smart enough to

cast a fuzzy-eyed gaze over this scene and note the big picture; what do the kids want? Street scramblers! Café racers! Customizable bikes! No plastic wrapping! Light and fun and cheerful, not high-tech and hyperfast and specialized. A couple of years ago, I sat for dinner beside Stephan Schaller, head of BMW Motorrad, who asked my opinion on what BMW should do next. My answer was brief: "Less R&D, more RSD." Roland Sands had just completed the Concept 90 prototype of the R nineT, which was and remains a very exciting machine. Now BMW casts R nineTs and even six-cylinders on custom shores, scattering them like seeds to small, quirky shops to see what grows. By these steps onto custom turf, the Bavarian is seen as stodgy no more. Other factories have taken note, repeating the formula. Yamaha recently teased the debut of the retro-theme FZ-07 variant in Europe—the XSR700—with a custom called "Faster Son" by Shinya Kimura.

Don't be fooled thinking this is a sidebar to their regular business of designing boring bikes for old dudes; the new Ducati Scrambler and BMW R nineT would not exist without Bike EXIF et al, and they're the hottest sellers. After discussions with a few factory designers, it's clear more custom-inspired bikes are coming, as there's big money at stake—perhaps the future of motorcycling itself. Nobody since 1950 has required a bike in the First World, which makes every one of them a luxury item, a source of pleasure, and a toy for the relatively affluent. That's not a bad thing, as life without pleasurable pursuits is hardly worth living, and while the best things may be free, some pretty excellent ones cost money and have wheels. **CW**

## BY THE NUMBERS



10,000

ATTENDEES TO  
A RAINY 2015  
WHEELS & WAVES  
FESTIVAL IN FRANCE

32

AVERAGE AGE  
OF THOSE  
WET VISITORS

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---

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# SHAPE AND STRESS

THE SCIENCE OF STIFFNESS AND STRENGTH **BY KEVIN CAMERON**

**A** material basic to much manufacturing is rolled sheet or plate. We can crudely model it with paper and scissors. Cutting a narrow strip and pulling on its ends reveals good tensile (pulling) strength. But when you push the ends together, the material buckles immediately. Fighter pilots in World War II reported seeing the upper skin of their wings thrown into waves by such compressive buckling during high-G pullouts. The skin on the bottom of the wing is under high tension, pulled tight and smooth.

If we now fold our paper strip lengthwise at right angles, we've made the equivalent of an "angle iron." The fold doesn't change its tensile strength, but when we push the ends together, the fold stiffens the paper, making it resist buckling a bit better. If we fold the strip one more time, we get a U-beam; it has fair bending strength and buckling resistance but resists twisting poorly. Structurally, it is a box without a top. We have all been impressed with how much stiffer a cardboard box becomes once its top is closed and taped. I once drew a swingarm this way—top, bottom, and sides were thin floppy sheet metal, causing the fabricator to say it could never work. But once welded together it became extremely stiff.

For even better compressive resistance, we could fold our paper strip lengthwise three times to make a box beam. Now each of its four faces is braced against buckling by two others. Old-time steel truss bridges on county roads had their top members made this way (riveted box beams) because, just as with the upper surface of an airplane's wing, when a load is applied to the bridge the upper members are placed in compression. Box construction keeps the plate material in those beams self-braced against buckling. When Kawasaki in the 1980s built its KR500 GP bike, the engineers chose a box beam for its chassis.

Instead of making a box beam, we could roll our paper strip into a tube. At some time in our early lives we have played with paper or plastic straws (to the consternation of parents, who had not expected lunch to become a series of structure experiments). A straw standing on a table can support a remarkable vertical (compressive) load before some portion of its length flattens, loses bending strength, and kicks sideways in collapse. Like the corners of a box beam, the tube's curvature is self-bracing against buckling. Engine pushrods, which in dragracing must support dynamic loads of many thousands of pounds, are tubular for this reason.

Another approach to bracing a flat strip against easy bending is to stabilize its edges against buckling by attaching other strips to make an I-beam. When we support this from its ends we can see why it is so often used in construction. Its three elements are the vertical web (our original paper strip) and its horizontal top and bottom flanges. All three brace one another against buckling under load, and when load is applied somewhere along its length (as in the wing or bridge mentioned earlier) the flange on the bottom resists tension, the flange on the top resists compression, and the web that joins them carries load in shear.

Webs carrying shear load are always on view on busy highways in the form of visible tension and compression in the vertical thin sheet-metal sides of box trailers. They are constructed as a box-beam (which is an I-beam with two shear webs; the floor of the trailer is the bottom flange, the roof is the top flange, and the thin sheet metal sides are its two shear webs). On a loaded trailer you can see lines of tension in the webs pointing diagonally down and toward the center, with ripples of buckling at right angles to them.

Ducati's steel tube trellis frames are



## BY THE NUMBERS

# 211.4

WINGSPAN, IN FEET, OF BOEING'S 747-400, AIRLINER, WHICH HAS A MAX TAKEOFF WEIGHT OF 875,000 POUNDS



# 169.8

WINGSPAN, IN FEET, OF BOEING'S C-17 MILITARY CARGO JET, WHICH HAS A MAX TAKEOFF WEIGHT OF 585,000 POUNDS

# 1,204

APPROXIMATE WEIGHT, IN POUNDS, OF ONE CUBIC FOOT OF GOLD. SAME VOLUME OF LEAD WEIGHS "ONLY" 708 POUNDS

just special-purpose bridges. Their upper and lower horizontal tubes resist compression and tension (which reverse when you brake hard, throwing the top members into tension and the lowers into compression). Upper and lower tubes are connected by diagonal tubes, performing the function of the truck trailer's shear webs and giving the structure strong resistance to "parallelologramming."

Today's chassis with twin aluminum beams perform the same functions of resisting bending and twisting, but they do it as flattened tubes or in box-trailer fashion, using their sides as shear webs.

When the two Phils (Vincent and Irving) were designing the postwar Vincent Series B Rapide V-twin, they were advised to "dish all sections." A flat cardboard disc is not a paper plate, so if we put a nice helping of spaghetti and meat

sauce on it, it bends and dinner goes on the floor. But if we give the cardboard a dish form, with raised edges, we give it inherent bending resistance. In order to bend, the plate must become flat. But it can't because to achieve that we'd have to stretch the raised outside of the plate. Its tensile strength resists that stretching. So it is with engine cases and covers. Any parts that are made flat can bend, but those given dish-like curvature much more strongly resist bending. And so the postwar Vincent engine's convexity has attracted many admirers.

Designers of beams and tubes to resist bending loads soon note the value of separating the compression and tension sides as much as possible, for the closer together they are, the more leverage an applied bending load has to buckle the compression side or stretch the tension side. So to increase the strength of an

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I-beam, we make its shear web wider, putting more distance between the upper and lower flanges. In the case of a tube, we increase its diameter.

A solid bar is structurally inefficient because so much of its mass is close to its center, where it has no "leverage" with which to resist bending or twisting. Better to concentrate the mass as far from center as possible, giving it leverage with which to resist. So we arrive at the monocoque (single shell) structure. Closest to this is the thin tube fuselage of large aircraft, whose skin is its strength. To prevent local buckling and allow attachment of such things as floors, ring-like formers and longerons (stiffeners) may be either riveted in place or, in modern practice, integral-machined as features of the skin's inner face.

Discovering things is play. Figuring out why they work is science. A wonderful process. **CW**

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# THE NEW SUPER



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**UNREAL RIDES  
FOR THE REAL WORLD**

By Brian Catterson Photography by Jeff Allen

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→ **BMW S1000XR** → **DUCATI MULTISTRADA 1200S** → **KAWASAKI VERSYS 1000LT** → **KTM 1290 SUPER ADVENTURE**

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# BIKES





W

hen the BMW R1200GS was introduced in 2004, a key designer observed that as motorcycles were getting better and faster, roads were getting worse. It's no secret that race-bred superbikes have outpaced their usefulness on public roads, not just because of their otherworldly performance but because the pavement beneath them is literally crumbling.

That's a big part of why adventure bikes like the GS have become so popular. Add in all-day comfort, a dash of practicality, and some unparalleled versatility, and you have a bike that can do anything: "The Swiss army knife of motorcycles."

Naturally where BMW was so successful, the competition was compelled to follow, which led to the inevitable arms race. In spite of a series of performance-enhancing upgrades, the venerable GS was eventually outgunned, not just by its adversaries but by one of its comrades. Enter the new-for-2015 BMW S1000XR, which joins the similarly four-

cylinder Kawasaki Versys 1000 and the twin-cylinder Ducati Multistrada 1200S and KTM 1290 Super Adventure at the sharp end of this developing adventure sports category.

To find out which one of these four bikes is best, we embarked on a three-day tour from CW HQ in the OC up the Pacific Coast, then clear across the Central California Valley, over the Sierra Nevada Mountains, and back. By the time we got home we knew the lay of the land—literally and figuratively.

#### BMW S1000XR

This is one model no one saw coming, as adventure bikes have traditionally had two cylinders. Then again, Triumph has offered its Tiger triples for some 15 years now, so a four is a logical progression.

And, really, BMW just did what Ducati did with the Multistrada 1200: slot its latest superbike engine into a more touring-oriented platform. Not necessarily one



BMW S1000XR



KTM 1290 SUPER ADVENTURE



suited for off-road use, however, because while the Beemer definitely looks the part of a go-anywhere adventure bike—and carries that evocative XR suffix—it's decidedly pavement oriented.

Start with the 999cc engine, which even in tuned-for-torque form is still the horsepower king of this class. Although it uses a traditional firing order, the exhaust note sounds notably flatter than the S1000RR superbike, like a big-bang motor. Bonus points for having an electronic quickshifter that allows clutchless upshifts and downshifts and a slipper clutch that aids the latter.

Like the other bikes in this class, power output can be tailored via multiple ride modes. The optional Dynamic ESA suspension is semi-active and utilizes a bank-angle sensor that also sends info to DTC, and ABS Pro, which are a part of the optional Ride Modes Pro. We like that the electronics' user interface is easy to understand and that

the optional GPS (\$799) integrates with the bike's electronics to display a number of parameters on its 5-inch screen.

While the S1000XR is loads of fun to blast up a twisty back road, it's not quite as pleasant over the long haul. While the rider triangle is spacious, the seat locks you in one place—you can move from side to side but not front to back. Thin padding doesn't help. The adjustable windscreen also offers merely adequate protection in either of its two positions. But the biggest buzzkill is the incessant buzzing: There's a narrow window around 6,000 rpm—which equates to 80 mph in top gear—where it's tolerable, but stray too far either side of that and the grips grow larger in your hands. Plus, if your fingernails graze the backs of the hand guards (a \$100 option), it feels like you're being electrocuted!

As you'll notice in the accompanying photos, our S1000XR was equipped with aftermarket soft luggage (\$569.97 from

AltRider). Because BMW North America didn't have any factory saddlebags (\$1,037) that were keyed to match our testbike's ignition, it declined to provide any.

At \$18,850 including the \$2,400 premium package, the S1000XR certainly isn't cheap. Still, it's not the most expensive bike in this class. And as the old saying goes, you get what you pay for.

### **Ducati Multistrada 1200S**

Arguably the most familiar machine in this group, the Multistrada was updated for 2015 with DVT variable valve timing. The \$17,695 base model comes standard with a huge array of features, such as DTC traction control and Bosch Cornering ABS. And our \$21,294 S-model testbike adds a slew more, including a full-TFT digital dash, full-LED cornering headlights, Sachs Skyhook semi-active suspension, and a multimedia system that connects to your cell phone via Bluetooth. Our tester was further equipped



**KAWASAKI VERSYS 1000LT**

**DUCATI MULTISTRADA 1200S**





with the Touring package (\$1,500) that adds hard saddlebags.

As on previous versions of the Multistrada, the riding position is sporty yet comfortable. Some of my cohorts whined that the seat padding was thin and wiggle room scant, but I felt it was fine—and incalculably better than the original Multistrada 1000. The windscreen does a great job of deflecting air and is easily adjustable with one hand, even in motion.

Whack open the throttle and you'll find the Ducati has the horniest-sounding motor, with the massive airbox between your thighs taking audible deep breaths. There is tons of torque, as you would expect from a 1,198cc V-twin, but it hauls the mail on top too. At freeway cruising speeds (5,000 rpm at 80 mph) the motor gives off soothing vibes with no bothersome vibration.

But our testbike didn't run great at first, noticeably laying down through the midrange before picking back up as the revs climbed. This was clearly an issue, considering that DVT exists to broaden the power through the midrange. We suspected it was software related and were correct: A subsequent trip to Newport Beach Ducati to have the ECU re-flashed eliminated that problem. We still wonder why the tripmeter reset itself every time we shut off the ignition on this keyless bike. As motorcycle software gets ever more complex, "version" updates will be ever more common.

The level of technology on the Multistrada rivals that of a spaceship. I happened to be riding it at sunset one evening and watched as the dash display automatically changed from a light background to dark, the buttons on either end of the handlebars illuminating. The display also changes depending





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OVER THE LONG HAUL.”

on which ride mode you've selected, the rev-counter becoming more prominent in Sport mode.

On one hand the Multistrada has the widest range of adjustability in this group, with four riding modes and no fewer than eight levels of traction control that can be mixed and matched. But on the other hand the Multistrada's electronic interface is the most complicated, taking the longest time to learn how to use.

That said, the Ducati's greatest strength is its ability to tackle any sort of road while remaining utterly undaunted. That's where the Multistrada name (Italian for "all roads") came from, after all. And that's a big part of why CW chose it as the Best Touring Bike of 2015.

### **Kawasaki Versys 1000LT**

Kawasaki might be a new contender in the adventure bike category, but its entry is not. The Versys 1000 has been available overseas for a while now and is based on the familiar Ninja 1000 model. If you recall all the accolades that bike earned, you'll know it's a solid platform.

Albeit a simple one: Whereas the other bikes in this comparison bristle with technology, the Versys has only ABS, two power modes (Full and Low), and three levels of KTRC traction control. The fork and shock are manually adjustable for spring preload (with a remote knob in the rear) and rebound damping (up front in the right leg only). The windscreen is height adjustable via two unattractive knobs that are difficult (if not dangerous) to operate while riding. There is no cruise control nor gear indicator (that's a \$200 option), though a little Economy emblem pops up when you're getting good gas mileage. Other options include heated handgrips, DC power outlet, fog lamps, luggage rack, and top trunk.

Regardless of all that, the Versys is a very nice motorcycle. Throw a leg over it and you'll immediately feel at home, like you've been riding it your whole life. The ergonomics are the sportiest of this lot but still all-day comfortable, with a one-piece seat that is nicely padded, though the aforementioned windscreen does buffet more than the others. It is very much a streetbike, however, as the shape of its handlebars and fuel tank are not particularly conducive to standing, and the footpegs are rubber-covered with no metal serrations. That's no good in the dirt.

But point the Versys up a twisty





back road and you could be forgiven for thinking it's a Ninja. There's no faulting the 1,043cc four, which is torquey, quick-revving, and slick-shifting, the latter aided by a slipper clutch. It's also remarkably smooth, the bars and mirrors remaining pleasantly vibration-free until you creep up on redline. The chassis also handles very nicely and is quite composed—you have to push it pretty damn hard to expose the shortcomings of the price-point suspension.

Still. At one point in our ride, cresting Sherman Pass (elevation 9,200 feet), the road was freshly chip-sealed in places,

potholed and tar-snaked in others, and the roadside trees cast long shadows due to the setting sun. That made reading the surface extremely sketchy, and while I appreciated the Versys' sure-footed handling, I couldn't help envying my fellow test riders with their cornering ABS.

One could point out the Versys' lack of electronic rider aids and say that it's dated. But you can't mention that without also mentioning the price, which at \$12,799 including standard color-matched saddlebags undercuts the competition by many thousands of dollars. In some ways, being dated isn't a bad thing.



**...POINT THE  
VERSYS UP A  
TWISTY BACK  
ROAD AND  
YOU COULD  
BE FORGIVEN  
FOR THINKING  
IT'S A NINJA.**







## SCIENCE FICTION

Exploring the limits of electronic rider aids



For the ABS test, we rode a Multistrada fitted with outriggers. And while it proved possible to brake across the slippery tiles with ABS disabled, panic braking saw the bike immediately flop over. With ABS enabled, the bike rolled smoothly to a stop.

Electronic rider aids have come a long way. Back in 1988, I attended the press introduction for the very first motorcycle equipped with antilock brakes, the BMW K100RS-ABS. Attendees flew all the way to Berlin, Germany, to ride the bikes down airport taxiways that were alternately dry, wet, and covered in gravel.

That system seemed high-tech at the time, but it was actually quite primitive. Drawing from automotive technology and developed with FAG Kugelfischer, it added nearly 30 pounds to the weight of the motorcycle and cycled just seven times per second.

Fast-forward to 2015 and the latest Bosch ABS 9.1ME hydraulic unit is dramatically smaller, lighter, and faster. It also has greatly enhanced capabilities, electronically linking the front and rear brakes, and coordinating with a lean-angle sensor, called an Inertial Measurement Unit, to allow threshold braking while leaned over. Bosch calls this system Motorcycle Stability Control, though "cornering ABS" is the popular term. And that's just ABS: The German

company also offers traction/slide control, wheelie control, and rear-wheel lift-up mitigation.

That all sounds great on paper, but the burning question is: Where are the limits of this technology? To afford us that opportunity, Ducati invited us to the Bosch Proving Grounds near Detroit, Michigan. There we rode Multistrada 1200s in four drills that let us explore wheelie and stoppie control; ABS and traction/slide control on gravel; ABS on various slippery surfaces; and cornering ABS and traction/slide control on a skidpad. Making the tests even more dramatic was the fact that it was pouring down rain! But the Bosch folks remained undaunted. "We've tested in much worse conditions than this—freezing rain even," one engineer remarked.

Thankfully, the systems performed as advertised. And while slewing sideways exiting a gravel-strewn corner and braking across ceramic tiles meant to emulate ice and snow proved impressive, the skidpad drill was the most mind-blowing. With water pooling on the asphalt

surface, we were able to slam on the brakes or whack open the throttle while dragging the footpegs and somehow not crash! Perhaps most impressively, aside from the occasional flashing light or change in engine note, there was very little sensation that these systems were working.

Explaining how all of this technology works would require a doctoral thesis, but suffice it to say there's some serious math involved. "To know whether a road is gravel, we look at the third differential of the wheel speed," one engineer began to explain before being silenced by a paranoid PR person. The various systems are said to contain some 100,000 lines of code, developed over thousands of hours of testing. So while the components themselves aren't that expensive, the R&D costs are substantial.

Three decades ago that BMW, I could not have imagined what the future held in store. Today's electronic rider aids are truly the stuff of science fiction and make riding incalculably safer while not reducing the thrill of the ride one iota. It's black-box magic!





### KTM 1290 Super Adventure

The new-for-2015 KTM 1290 Super Adventure is the natural result of pairing the 1190 Adventure chassis with the 1,301cc V-twin from the award-winning Super Duke R. But the result is much more than the sum of those parts...

It would take more space than we have here to discuss all of those details, but the thumbnail sketch shows variable drive modes, traction control, cruise control, semi-active suspension, cornering ABS, cornering lights, hill assist, and anti-engine-braking.

Shut off the electronic rider aids and the Super Adventure is an absolute hooligan, in spite of its motor being “de-tuned” from Duke R spec. We love this engine’s combination of low-end grunt, top-end zeal, and the slick shifting afforded by the slipper clutch. Turn the electronics back on and the bike feels remarkably composed, no matter the road conditions—there’s seriously no ruffling its feathers!

Austrians tend to be taller than your average American, so the riding position is rangy. Some of our test riders felt

**THE NEW-FOR-2015 KTM 1290 SUPER ADVENTURE IS THE NATURAL RESULT OF PAIRING THE 1190 ADVENTURE CHASSIS WITH THE 1,301CC V-TWIN FROM THE AWARD-WINNING SUPER DUKE R.**

#### UPS

#### DOWN

#### BMW S1000XR



- Knows an apex and what to do with it
- Electronics easier to understand than Windows 7.0
- ADV meets SBK

- V-v-vib-b-bration!
- Settle in. You’ll be staying for a while.
- Looks more than a little Multistrada-ish in red

#### DUCATI MULTISTRADA 1200S



- Forget the Gold Wing. This is the best touring bike made.
- Electronic rider aids to rival the 1290 Super Adventure

- It costs how much?!
- Engine mapping needed to be re-flashed to run right
- Dash display has more levels than *Super Mario Bros*

#### KAWASAKI VERSYS 1000LT



- Smooth, fast, comfortable
- Nicest saddlebags, with invisible mounts
- Slightly more than half the price of the others

- Features? What features?
- What do those screws on the suspension do?
- The ‘90s called. They want their bike back.

#### KTM 1290 SUPER ADVENTURE



- Most sophisticated motorcycle on the road today
- Best aerodynamics
- When the road ends, keep going!

- Is “ruggedly good-looking” a compliment?
- Seat is only slightly softer than a picnic bench
- Heat between thighs

## THE NUMBERS

BIKE		BMW S1000XR	DUCATI MULTISTRADA 1200S	KAWASAKI VERSYS 1000LT	KTM 1290 SUPER ADVENTURE
Price	🔗	\$18,850 as tested	\$21,294 as tested	\$12,799	\$20,924 as tested
Dry weight	🔗	505 lb.	519 lb.	524 lb.	528 lb.
Wheelbase	🔗	61.1 in.	60.6 in.	60.0 in.	61.3 in.
Seat height	🔗	33.2 in.	32.2 in.	33.0 in.	34.2 in.
Alternator wattage	🔗	486 w	500 w	194 w	450 w
Fuel mileage	🔗	34 mpg	37 mpg	38 mpg	35 mpg
1/4 mile	🔗	10.23 sec. @ 135.48 mph	10.60 sec. @ 129.29 mph	11.14 sec. @ 119.88 mph	10.57 sec. @ 130.27 mph
0-60 mph	🔗	2.8 sec.	2.9 sec.	3.1 sec.	2.9 sec.
Top gear 40-60 mph	🔗	2.7 sec.	3.3 sec.	3.3 sec.	3.1 sec.
60-80 mph	🔗	2.7 sec.	3.3 sec.	3.5 sec.	3.2 sec.
Top speed	🔗	154 mph	146 mph	136 mph	147 mph
Horsepower	🔗	151.2 @ 10,790 rpm	133.7 @ 9490 rpm	109.0 @ 8800 rpm	135.2 @ 9540 rpm
Torque	🔗	79.3 lb.-ft. @ 9050 mph	83.7 lb.-ft. @ 7810 rpm	69.8 lb.-ft. @ 7080 rpm	89.6 lb.-ft. @ 6670 rpm
Braking 30-0 mph	🔗	28 ft.	29 ft.	33 ft.	32 ft.
Braking 60-0 mph	🔗	113 ft.	120 ft.	129 ft.	127 ft.

the seat was too firm and resorted to standing on the pegs for long stretches, but I thought it was fine—certainly a vast improvement over the original 950 Adventure's picnic bench of a saddle. Some also noted that the handlebars buzzed, though nowhere near as badly as the BMW's.

Speaking of the seat, like the handgrips it's heated, with separate controls for the rider and passenger. And the heated fuel tank is a nice touch too. Oh, you say that's not a feature? Whatever, there's a significant amount of heat coming off the rear cylinder and you will feel it.

We really liked the KTM's windscreen, as it afforded the best protection of this

bunch, even if the NACA duct on top made it hard to see through and it was difficult to adjust on the fly. We also appreciated the Jesse-style panniers, which, while wide, are large, don't need to be locked to remove the key, and have handy bungee-cord hooks on top.

We did have a couple of minor issues with our testbike. First, the fuel gauge magically showed the tank to be full at all times. Eureka, perpetual motion! Probably a level sensor needs to be replaced. But with 8 gallons of gas on board, we weren't worried about running out.

Second, after the inner seal that allows the use of a tubeless tire was

damaged during a routine tire change, the rear developed a slow leak. An emergency stop at Santa Barbara Motorsports resulted in the tire being fitted with a tube, which fortunately held air for the duration of our trip. In light of this development, we have to say that we prefer BMW's tubeless system, which cleverly positions the spoke heads outboard of the tire beads. On a positive note the KTM is the only bike in this test with a 19-inch front tire, which works much better in the dirt than the others' 17s while being only slightly less desirable on pavement.

At \$20,924 including luggage, the 1290 Super Adventure is super expensive but still costs less than a fully decked-out BMW GS, while giving you a whole lot more for your money.

## Conclusion

It might be a cliché, but which one of these four motorcycles is best comes down to the rider. If you're on a budget, choose the Kawasaki. No apologies necessary, it's a great bike for the money. If you're all about sporty back-road performance, pick the BMW. It's the superbike of the class. If you prefer something a bit more sophisticated and don't plan to stray too far from the tarmac, the Ducati is for you. But if you want a bike that can truly do it all, you can't go wrong with the KTM. It does everything the others can do on road, plus it's the only one with true off-road capability. CW chose the 1290 Super Adventure as the Best Adventure Bike of 2015, and we'll second that vote here. **CW**



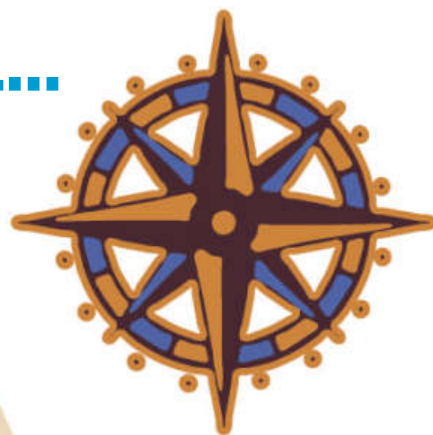


# IT'S NOT AN ADVENTURE UNTIL...

## TIPS AND TRICKS TO MAKE YOUR ADV RIDE SAFER AND MORE FUN

BY MARK LINDEMANN

**WHAT DOES ADVENTURE MEAN TO YOU?** As soon as the gas gauge wanders below the halfway point, some guys start wringing their hands and thinking about drinking their own urine. Others don't think it's a real injury unless you can see an exposed bone end. Adventure riding means the occasional inconvenience. Here are some tips and tricks that have made it all fun.



### FAVORITES

#### FAVORITE MULTITOOL:

Leatherman Surge

#### FAVORITE "CHEAT" TO START A FIRE:

Arc from battery terminals

#### FAVORITE "FIX-ALL" ITEMS:

- Duct tape wrapped around tire irons
- 50 feet of parachute cord
- Tube of epoxy putty
- Ten feet of 0.032 safety wire

#### FAVORITE EDIBILITY ENHANCERS:

- Tabasco
- Salsa Lizano
- Tamazula Extra Hot

#### FAVORITE DIGESTION CORRECTION:

- Alka-Seltzer Lemon Lime
- Lomotil
- Imodium Multi-Symptom Relief
- Baby wipes and first-world toilet paper in Ziploc bag

### THE "ALWAYS" BAG

Years of climbing, hiking, skiing, hunting, and riding have taught me the importance of being warm, dry, and comfortable at night, especially if you have no sleeping bag or tent. To that end, I carry my "always" bag. Small enough to tuck into the corner of a daypack or saddlebag, it's the difference between shivering and snoring.

- Thin balaclava "ski mask" hat
- Capilene long-underwear top and bottom
- Fleece socks
- Buff-type neck gaiter
- Thin liner gloves



**DRINK BOTTLED WATER. USE MORE HOT SAUCE.**



### KEY TO ADVENTURE

While dirt bikes don't need a key, dual-sports and ADV machines do. Once, in Death Valley, I went to start my bike in the morning and found only the key's head remaining—the shaft had broken off and is still somewhere in the desert. Such are the rigors of the ADV lifestyle. Now I keep a spare in the bike's battery box and another tied to the axle wrench in my tool kit. A flat key underneath your boot's insole works too.



### TROUBLE AHEAD

Many survival shows and courses are designed to emphasize woodcraft skills, like trapping animals. In my experience, ADV riders need a different priority list. Most likely trouble will find you because the bike breaks, you break (like a bone), you get lost, you get sick, or you run out of gas. Riding with a companion will go a long way toward addressing most of these, but due to my charming personality I often end up riding alone. Here's what you can do.

**THE BIKE BREAKS:** Start with a bike in superior condition, especially the tires. Changing your own tires and doing your own routine maintenance helps prepare you as well. So does learning to ride well enough so you don't crash.

**YOU BREAK:** Take a first-aid class. Training, not a first-aid kit, saves lives.

**YOU GET LOST:** You can buy a GPS, but mostly this means paying more attention and consulting your map more frequently. Talk to the locals too.

**YOU GET SICK:** Wash your hands more. Use hand sanitizer. Ninety percent of this is ass-to-mouth disease. Drink bottled water. Use more hot sauce.

**YOU RUN OUT OF GAS:** Poor planning. Carry a siphon hose. Never be on the bike with the smallest tank. **CW**



Engineered with





# THE MIDDLE ROAD

TRIUMPH'S TIGER 800 XCx  
FILLS THE GAP BETWEEN  
DUAL-SPORTS AND  
OPEN-CLASS ADVS

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By **Blake Conner**

Photography by **Jeff Allen**









**T**urning the front wheel of the new-for-2015 Triumph Tiger 800 XCx toward the black sand and volcanic rocks of our favorite cinder mines near old Route 66 in the California desert was both thrilling and scary. As a lighter-than-liter-class ADV bike with a manageable middleweight-size engine, off-road-oriented wire-spoked wheels, and a suite of rider aids, the Tiger XCx had a lot of new tools to carry those big pannier boxes into this challenging territory. But 115-degree ambient temperatures and street-oriented Bridgestone Battle Wing tires on this giant black, sandy, solar-panel-like piece of earth made our future seem so uncertain, so unstable, almost light-headed.

Turns out I didn't need to worry so much. The Tiger's many upgrades and much-improved electronics made it fully manageable in these tough middle-of-

nowhere desert conditions.

New for 2015, the Tiger 800 line (including two street-oriented cast-wheel XRs and two spoked XC models) got a big overhaul. With power delivery from this 800cc triple in a happy place, Triumph chose to refine the chassis, work on creature comforts, and boost computing power in the rider-aid package. There are a couple of reasons for this approach. First, for many of Triumph's markets there are horsepower restrictions, and the Tiger was already close to the magic 95-crankshaft-horsepower limit for certain European countries with tiered licensing. Second, with 84 hp and 52

pound-feet of peak torque measured at the rear wheel on the Cycle World dyno, the bike already has a sweet combination of power and a great torque spread. So why mess with it? Our original intent was to pair the Tiger with BMW's F800GS Adventure, its only natural competitor available in the US, but with the German company unable to meet our request in time, we went off the beaten path solo. After riding the XCx last year in Spain, we've been waiting to sample this bike on home soil, the rougher the better. Chassis tweaks, much improved electronics, and the XC's more off-road-oriented wheel package (in dirt-friendly 21-inch front, 17-inch rear sizes) boosted the bike's performance all around, but we wanted serious seat time to find where it stood on road and off.

We requested the "x" package for our testbike, which includes more sophisticated electronics and additional features, such as cruise control, auto-canceling turn signals, additional accessory power socket (there are



two here), advanced trip computer, adjustable WP suspension front and rear, aluminum skid plate, hand guards, radiator guards, and a centerstand.

As a touring bike, the Tiger 800 has improved dramatically. Little things that just a few years ago we thought we could live without have now made long rides much more relaxing and tolerable. With cruise control, a nice bubble of buffet-free air behind the manually adjustable windscreen, and an upright and comfortable seating position, rider fatigue is minimized at the end of a long day in the saddle. As for the seat itself, it actually borders on the edge of too soft, offering a cushy feel but ultimately lacking long-haul support. Of course, this is an easy aftermarket fix. Another minor complaint is that the cruise control is too easily deactivated by rotating the throttle forward—big bumps in the road can jostle the right wrist enough to kick you out of cruise.

Triumph still needs to work on simplifying dash menu navigation. Practice here does lead to proficiency, of course, but this interface could definitely be made simpler and more intuitive. On that note, with such a small LCD screen, due to the real estate taken up by the



large analog tachometer, some of the fonts on the screen are all but impossible to read in bad light or with a dark visor. Triumph, please see KTM's menu nav setup and copy accordingly.

Another upgrade that the XCx has over its XC brother is higher-end WP suspension. Unlike the liter-plus flagships from Ducati, KTM, and BMW also featured in this issue, the XCx's dampers are manually adjustable. Is this good or bad? We have grown accustomed to electronic suspension, and the very point of ADV touring is the ability to jump from pavement to dirt road to trail and back again at will. Electronic, semi-active suspension allows for settings to change on the fly for every inch of it. Which is why electronic suspension is sorely missed on an ADV like the



Tiger—especially considering this bike's \$16,235 as-tested price—leaving you with a compromised setup most of the time. That said, there is an attraction to the simplicity and reliability that manual suspension offers.

On the highway, the Tiger's cushy suspension offered a plush, comfortable ride, but load up the bags or throw on a passenger and you'll be making manual preload and damping adjustments old-school style. You're stuck with the fork preload since it's not adjustable, but the shock has an easy-to-use knob and works over a useful range. The fork spring rate is on the soft side, so even with very lightly loaded bags and no passenger, this Tiger tends to ride low in the stroke. On curvy mountain roads, dragging the centerstand when hitting bumps or trail braking was all but guaranteed. I cranked in some compression damping using easy-access, no-tool, fork-top clickers to slow the dive and help use less travel over bumps.

A perfect example of what an ADV bike excels at was proven to me as I rode along a particularly horrible section of old Route 66. The road approaching Ludlow, California, is one of the most beaten sections of tarmac you will ever ride, with potholes and missing pavement, the whole thing littered with gravel. But on the Triumph, cruising at 85 mph was not only possible but comfortable. A big thank-you goes out to the bike's long-travel suspension and large-diameter wheels.

Okay, on-road touring is solid. How is it off road? There is no better test than sand, with this bike's non-knobby tires largely defining its performance limitations. As mentioned, our primary off-road testing and photo-shoot location was an inactive cinder mine that features everything from dune-like mountains of black sand to fields of golf-ball-size, sharp, and nasty lava rock, all scorching hot under a blazing summer sun.





## OTHER BIKES IN THE CLASS

KTM 690 ENDURO



BMW F800 GS/A



2016 KTM 800 ADVENTURE



The middleweight ADV market is underrepresented. Options in this class include KTM's 690 Enduro, BMW's F800GS Adventure, and perhaps the rumored new KTM 800cc twin that we expect to be revealed at EICMA in November.

After a few near crashes in the sand, I dropped the tire pressures down to a more ADV-appropriate 21 psi, which improved traction noticeably. I won't lie: Despite weighing 40 pounds less than most of the liter-plus ADVs (and 33 less than the old Tiger XC), the XCx was work to keep upright in this most extreme of environments. With that said, the bike feels far more at home in the soft stuff than its predecessor did. Back on hardpack, the bike was very easy to control, which has just as much to do with the chassis as the bike's electronics package. Throw on a set of knobbies like Continental's TKC 80s, and the possibilities open way up.

Like most of the ADVs on the market, the Triumph offers an excellent suite of electronic rider aids. And as mentioned, the "x" model gets more sophisticated

software than the standard XC. Modes include Road, Off-Road, and the customizable Rider. Each one of these modes is essentially an umbrella for a particular riding environment, with preset traction control (Road, Off-Road, or Off), throttle maps (Sport, Road, Off-Road, and Rain), and ABS settings (Road, Off-Road, or Off) for each. By going into the Rider mode you can customize a combination that suits your personal tastes. I set up Rider with Sport power delivery, no TC, and no ABS for our photo shoot and toggled back and forth between that and the Off-Road mode, depending on the situation. The latter offers reduced power, less intrusive TC, and off-road-oriented ABS (which shuts off ABS to the rear wheel). This gave me quick access to two very different motorcycle behaviors and a lot of flexibility.

This bike's electronics represent the biggest leap forward from the old Tiger 800. The ride modes work great in their intended environments, boosting confidence and control in a way that allowed testers to get the most out of the bike in the safest manner. The standard Off-Road TC allows the rear end to step out just a bit but never lets it hang out to where the handlebar is on the steering stop. And while its ABS isn't the sophisticated lean-angle-sensing type used on the BMW, Ducati, and KTM flagships, the Tiger's worked well enough off road that I left it on for the majority of our dirt testing.

The many throttle maps give the XCx a good variety of power options

for every type of terrain. But at the core, this 800cc inline-triple delivers an incredibly fun and absolutely flat plateau of torque from idle to redline. Throttle connection and response are exceptional on this engine, no matter the mode. The electronic controls are purely icing on top of this great engine.

Like many of the other offerings in the ADV fold, the XCx is an incredibly versatile machine. We hear comments from a large chunk of readers who ask why we would ever ride such big bikes in serious off-road conditions, but on the flipside we've attended quite a few adventure rallies where we've seen a dedicated and hard-core slice of riders using these bikes in demanding environments on a regular basis. Our experience and observation? These machines can tackle far rougher terrain than many owners will put them through. And perhaps that is the point; for some, actually pushing these machines to their limit is a regular reality, and for others it's enough to simply know that it *can* go way out there.

You certainly can on the Tiger XCx. It is an exceptionally nice on-road touring bike that's a too-squishy seat and some excessive engine heat short of absolutely killing it—not just in the middleweight class either. The core mechanical package remains solid, with the bike's adventuresome nature boosted by the spoked wheels and much improved electronics, allied to its reasonably light weight. The middle road is a very good way to go. **CW**





## EDITORS' NOTES



**BLAKE CONNER**  
SENIOR EDITOR

→ Open-class enduros/dual-sports, 250cc MXers, and 300cc two-strokes—I love them all. So it is no surprise that I like my ADV bikes to be able to go where the asphalt ends and the washboard begins. Some ADVs are more capable than others, but the Tiger 800 XCx stepped up its game big time. Long days on the highway or challenging ones in the dirt, the XCx is a good tool for any adventure you can dream up.



**DON CANET**  
ROAD TEST EDITOR

→ While I didn't tackle a challenging single-track trail or whooped-out sand wash aboard the Tiger 800 XCx, I did work in a bit of fire-road fun along with plenty of pavement. Solo or with a passenger, I found Triumph's middleweight competent and capable across all surface conditions. The reduced size and weight comes as a welcome alternative to the heavyweight ADV offerings. Let the adventure begin.



**MARK HOYER**  
EDITOR-IN-CHIEF

→ I cheer for manual suspension! Even if I'd get this stuff rebuilt to suit me, I would take comfort in its analogness. Doesn't purely mechanical suspension *have* to be more reliable? I do love the latest electronic suspension, am amazed at how well it works, and admit it's never failed on me, but on a bike like this I will take my electronics in the form of really great rider aids, like power modes, traction control, and ABS.

## TRIUMPH TIGER 800 XCx

### SPECIFICATIONS

#### GENERAL

##### PRICE

LIST PRICE: \$16,235 as tested

IMPORTER: Triumph Motorcycles  
America Limited  
385 Walt Sanders Memorial Drive  
Newnan, GA 30265

CUSTOMER SERVICE  
PHONE: (678) 854-2010

WARRANTY: 24 mo./unlimited mi.

#### ENGINE & DRIVETRAIN

ENGINE: liquid-cooled, four-stroke  
inline-3

BORE & STROKE: 74.1 x 61.9mm

DISPLACEMENT: 800cc

COMPRESSION  
RATIO: 11.3:1

VALVE TRAIN: dohc, 4 valves per cyl.,  
shim adjustment

VALVE ADJUST  
INTERVALS: 12,000 mi.

FUEL DELIVERY: (3) 46mm throttle bodies

OIL CAPACITY: 3.9 qt.

ELECTRIC POWER: 430 w

BATTERY: 12v, 14ah

#### CHASSIS

##### WEIGHT

TANK EMPTY: 488 lb.  
TANK FULL: 519 lb.

FUEL CAPACITY: 5.0 gal.

WHEELBASE: 60.5 in.

RAKE/TRAIL: 24.3°/3.8 in.

SEAT HEIGHT: 32.6/33.4 in.

GROUND  
CLEARANCE: 8.5 in.

GVWR: 965 lb.

LOAD CAPACITY  
(TANK FULL): 446 lb.

#### SUSPENSION & TIRES

##### FRONT SUSPENSION

MANUFACTURER: WP  
TUBE DIAMETER: 43mm  
CLAIMED WHEEL TRAVEL: 8.7 in.  
ADJUSTMENTS: compression and rebound  
damping

##### REAR SUSPENSION

MANUFACTURER: WP  
TYPE: single shock  
CLAIMED WHEEL TRAVEL: 8.5 in.  
ADJUSTMENTS: rebound damping,  
spring preload

##### TIRES

FRONT: Bridgestone Battle Wing  
90/90-21  
REAR: Bridgestone Battle Wing  
150/70-R17

#### PERFORMANCE

1/4 MILE: 12.03 sec. @ 110.75 mph  
0-30 MPH: 1.5 sec.  
0-60 MPH: 3.6 sec.  
0-90 MPH: 7.2 sec.  
0-100 MPH: 9.2 sec.

##### TOP GEAR TIME TO SPEED

40-60 MPH: 3.6 sec.  
60-80 MPH: 4.1 sec.

MEASURED TOP SPEED: 120 mph

ENGINE SPEED @ 60 MPH: 4442 rpm

#### FUEL MILEAGE

HIGH/LOW/AVERAGE: 43/36/39 mpg

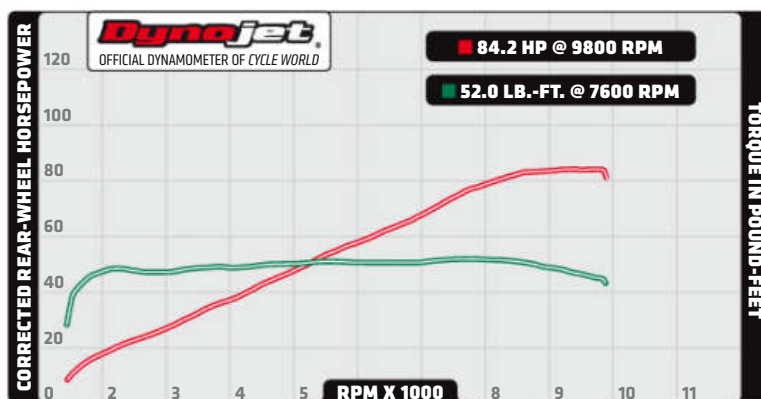
AVG. RANGE INC.  
RESERVE: 195 mi.

#### BRAKING DISTANCE

FROM 30 MPH: 34 ft.  
FROM 60 MPH: 131 ft.

#### SPEEDOMETER ERROR

30 MPH INDICATED: 29 mph  
60 MPH INDICATED: 58 mph





# COLORADO DREAMING

THE *CYCLE*  
WORLD  
ADVENTURE  
RALLY—  
ROCKIES  
EDITION

By *Mark Lindemann*


**The BMW F800GS was on its side and sliding in one direction, its rider in another,**

and I was hard on the brakes, sliding in a third, trying to remember what I'd learned in trigonometry class about converging angles and rates of speed before I too ended up in the ditch. Welcome to Colorado.

Snarkmeisters smugly observe that many contemporary adventure bikes see nothing more challenging than an oil spot in the driveway of the local Starbucks. Then you've got riders like the 70 or so like-minded folks out here for the 2015 Adventure Rally—Rockies Edition. The idea is to ride your ADV bike the way it was designed to be ridden, in some of the best adventure-riding terrain you can find without a passport. And while most motorcycle rallies are ride-in-the-dust, follow-the-leader affairs, this one is completely different: more like a poker run, where teams of two, three, or four riders collect points for





A full-page photograph of a motorcycle rider on a rocky trail in a forest. The rider is wearing a helmet and gear, and the bike has a number 80 on the front. The trail is made of loose rocks and is surrounded by tall, thin trees with white bark. In the top right corner, there is an inset image of a rally sticker with the number 47 and the text 'Rockies Edition', 'GEICO', 'ADVENTURE RALLY SERIES', 'CUMMINS', 'CUSTOMER EXCLUS', and 'July 9-12, 2015'.

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PASSPORT.**

riding far and wide, on everything from two-lane highways to steep, challenging, committed single-track at elevations between 7,000 and 12,000 feet.

That's how we find ourselves in Gunnison, a little gem of the American West billed as "the base camp of the Rocky Mountains." Those 70 riders showcase a wide range of bikes and abilities.

On Thursday riders descend on Gunnison like a Viking raiding party and immediately go mano a mano with a special-skills course that tests their ability to jump logs and negotiate a tight, winding trail without dabbing. Clean the course and you gain a few points (more in a moment). It's a great icebreaker: Everyone gets to know each other, and there is also coaching from experts like Ned Suesse and Ed Mann.

Dinners and breakfasts are also communal affairs, and Friday morning the riding starts in earnest. Maps and route books highlight 89 destinations, each with a point value between one and 10, dependent on difficulty and remoteness. It's impossible to hit them all in the next two days, so the teams plan their routes and strategy carefully. Some of the riders are heart-attack serious, in it to win it. For me, it's really just an excuse to ride awesome country and see cool sights.

Colorado weather: Anyone who thinks ADV riding is just about Sahara sand dunes needs to spend a weekend in the Rockies. Gunnison serves up something from every column of

the menu: rain, hail, sunshine, mud, dust, snow, lung-bursting altitude, rocky uphill, alpine meadows, slick downhill—sometimes all before noon. And it's right about now that you realize what capable machines these modern ADV bikes are. With their electronic rider aids, traction control, and engine-management systems, they're some of the most interesting two-wheelers out there.

Saturday saw a special gymkhana course, designed by rally race veteran Suesse. Fast times won more points, and you could run it as many times as you liked. Want another challenge? How about a timed tire-changing contest?

That points thing: Saturday night the Rally crew totaled everything up, awarding the coveted Adventure Cup to the winning team. There were plenty of other prizes too—riding suits from Rev'It! and Klim, along with swag from event sponsors like Doubletake Mirror, Motion Pro, EBC, SBS, and Galfer Brakes, Butler Maps, GEICO Insurance, and BMW. And it's not exactly my definition of a bad day when Glenfiddich shows up and starts pouring single-malt scotch for everyone.

The year of 2015 marks the third year for the Rockies Edition of the Adventure Rally as well as its twin, the Sierra Edition. For information on either, just go to [cycworld.com](http://cycworld.com) and type "Adventure Rally" into the search bar. You'll have a great time. And nobody will ever accuse you of just "adventuring" to Starbucks again. **CW**



# ADV LITE

## CONQUERING THE WORLD (OR PORTIONS OF IT) 250CC AT A TIME

By **Mark Hoyer**

Photography by **Jeff Allen**

**A** 250 is not everyone's idea of an adventure bike, but the simplicity, lightness, and agility of a small bike will get you to more places with less work than any of the big guns. You must commit to the 60- to 65-mph cruise and "lack" of luxury. What you get back is going places no BMW R1200GS dares to tread and ability to right your fallen motorcycle with much lower hernia risk.

The \$6,690 Yamaha WR250R is a great platform, with a capable chassis and lots of snap from its revvy motor. But it needs mods for high-performance distance travel. Our goal was to build a bike that could, for example, be ridden from LA to Moab and then be stripped and re-gearred at a campsite for real enduro-style exploring. Total cost for all mods is high, but this is meant as a guide to show benefits of each change so readers can make their own decision on what's important to them. There are plenty of optional mods and places to save money. The important thing is to build your bike and go ride it!

### WHEELS | TIRES | BRAKES

Stock wheels are typically pretty soft, and the ones on our testbike were dinged in short order after some aggressive testing. For this build, we chose ultra-strong, enduro-race-ready D.I.D Dirt Star ST-X rims (\$199 front, \$229 rear; black only) with Bulldog spokes and splined nipples (\$100 per wheel) all from Dubya USA (dubya.com, \$60 labor per wheel). To control costs, we laced the new parts to the stock hubs. But to really control costs, don't ding the stockers in the first place. Still, the rim upgrade removes any suspicion of trouble, ever. Plus, black









looks cool, and for a significant upgrade in strength (15 percent, D.I.D says), they hardly weigh more than stock: The built front wheel was 7 ounces heavier, and the rear was 5 ounces heavier.

Pirelli Scorpion Rally front tire (\$125) worked great with an MT 43 Trials rear (\$126). Both have been long wearing and are a good compromise for dual use. If you ride in a lot of mud, a true knobby at the rear is a better choice. I also fitted a Scorpion Rally rear (\$145) and ran a set of MT 21 DOT knobbies (\$278). A combination of SBS racing brake pads (RSI 694 front, \$42; SI 790 rear, \$34) working on good-quality stock discs provided a major performance upgrade for very low cost.



## LUGGAGE

The best hard-core saddlebag and tank-bag solution we've found is from Giant Loop. Coyote 39-liter saddlebags (giantloopmoto.com, \$360) attach securely without using heavy metal racks and come with heat shields to protect from the hot muffler. Capacity is huge, and three waterproof liner bags are included. Diablo Pro tank bag adds 4 liters up front (\$210) and has a clear map pocket with a power cord inlet for devices. Zippered base has a fuel-cap cutout, meaning the bag can flip out of the way for easy refueling. There are cheaper solutions to carrying stuff, but these American-made pieces have been over mountains and across deserts with no issues.

## SUSPENSION

The WR250R has good core components that are, most importantly, rebuildable. But stock damping and springing are inadequate for larger riders or to carry any extra load. Go Race Suspension (go-race.com) is a Christiansburg, Virginia, full-service tuning shop that has built a worldwide reputation for WR250R expertise. Owner Travis Jones increased the fork spring rate to 0.48kg/mm and revalves using new components to his spec. At the rear, a 500-pound-inch spring replaced the 440-pound-inch stocker with compression and

rebound also heavily massaged. We spec'd a tune that would be adequate when the bike was loaded with gear and full fuel but were aiming for best performance when stripped. Handling and ride quality are phenomenally improved; it rides like a completely different motorcycle. Cost is \$1,140 if springs are needed, \$900 without. If you make one change to your WR250R, make it this one.

## RANGE | POWER

The stock fuel tank is 2 gallons, which isn't enough range for real adventure (even at an easy 65 mpg). A 4.7-gallon IMS fuel tank (imsproducts.com, \$400) can deliver about 300 miles. Because fuel is carried low in the shrouds, the full-tank weight increase doesn't have a big ill effect on handling or give an overly top-heavy feeling. When fuel level is lower, weight is actually carried lower than with a stock tank, which is a good thing. Bottom line is that I *never* worry about range. A Uni Filter air filter (unifilter.com, \$35) works in a modified airbox (opened-up inlet), which boosts overall power and engine response (with other mods). A Shorai lithium-iron battery weighs 1.4 pounds and has double the amp-hour rating of the stock, 4.6-pound lead-acid battery.

The stock exhaust system weighs 11 pounds, the FMF Q4 silencer (\$360) and PowerBomb header (\$200) just 6.5. The FMF setup also boosts bottom-end power substantially and provides about a 1.5-hp increase at its 26-hp peak. To ensure proper fuel delivery, a Dynojet Power Commander V EFI/ignition tuner (powercommander.com, \$400) and an Exhaust Servo Removal Module (\$65, needed to prevent an error code in the absence of the stock EXUP valve) are used. Engine response is fantastic. I'll never be able to do a crossed-up-wheelie, wheel-spinning corner exit like I might on a KTM 500 EXC, but the WR has had plenty of power to take me up every steep climb and rocky uphill, even at 10,000-foot elevation. And it's always easy to handle with a dry weight (without gas or luggage) of 290 pounds.

## PROTECTION

The flimsy plastic stock skid plate is pretty much only good for keeping some of the dust off the engine. Any big hit could spell the end for vulnerable parts. This aluminum skid plate by Flatland Racing ([flatlandracing.com](http://flatlandracing.com), \$95) is nicely made and has a very clean and quick installation using four screws in the stock frame tabs. A drain-plug cutout makes oil changes easy. Only downside is that, being metal, it reflects engine noise. I used thin rubber sheet to help damp the sound. The next solution was a Moose Racing Pro Skidplate ([mooseracing.com](http://mooseracing.com), \$159.95). The material is HDPE: high-density polyethylene or, basically, plastic. It took some bending to get the mounting holes to align properly, but the Moose plate is significantly lighter than the aluminum piece and reflects less engine noise. Plus, I have beaten the plate with no ill effects other than a few gouges.

## GEARING

The stock gearing is 13/43, which is too tall for technical off-road work (just ask my first clutch). A 120-link D.I.D 520 VX2 chain was cut to 112 links ([didchain.com](http://didchain.com), \$124) and run with a 48-tooth Renthal Ultralight rear sprocket ([renthal.com](http://renthal.com), \$70). This combo is great off road and gives an all-day 60-mph cruise. For highway use, an Ultralight 14-tooth front sprocket (\$33) is easily packed and swapped on the road; 14/48 is barely shorter than stock and gives 70-mph cruise. With the short-gearing setup, I haven't met a hill the WR won't climb.

## ERGONOMICS

Job one was replacing the stock steel handlebar. It bent easily and was too low and narrow. A Renthal RC High ([renthal.com](http://renthal.com), \$80) was much wider, higher, and stronger, for better comfort and steering feel. Cycra Probend hand guards ([cycraracing.com](http://cycraracing.com), \$134) block wind, rocks, and tree branches, as well as protect levers in a crash. The Garmin zumo 390LM GPS ([garmin.com](http://garmin.com), \$600) has great flexibility for mapping roads and trails, is Bluetooth compatible, and highly weather resistant. The best adventure mirrors ever are made by Doubletake ([doubletakemirror.com](http://doubletakemirror.com), \$48 per side). RAM mounts give ultimate flexibility (easy to flip in or remove), and new mirror glass can be glued in place in the unlikely event you break it.

I tolerated the stock seat for quite a while before trying a Seat Concepts "tall" saddle ([seatconcepts.com](http://seatconcepts.com)). Price for a cover and foam is \$160, but I opted for a complete seat assembly with new (indistinguishable-from-stock) injection-molded base for \$255. It's narrow at the front to allow aggressive stand-up riding but wider at the rear to let you sit down, slide back, and find comfortable support after a long day bashing around. The 1-inch-taller height also worked great for me and my 34-inch inseam and 6-foot-2 frame. It's like a different motorcycle, and I am happy to ride it all day on the highway and/or trail.

A Cee Bailey's clear windscreen ([ceebaileys.com](http://ceebaileys.com), \$90) was an excellent addition, and it's easily removable with wing nuts under the number plate. The screen's main benefit will come in cold weather and rain but does make a nice windbreak even at the typical 60-mph highway cruise. I probably should have popped for the headlight guard (\$20), since my bike's lens was shattered by a rock trail riding, but I was following the bike in front of me too closely. Next time I will pass him... *CW*

## WHERE WE'VE GONE

Putting ADV Lite to the test



Dreams of yearlong adventure rides from Alaska to the southern tip of South America have gone unrealized, but I have had some pretty amazing adventures on ADV Lite.

My favorite so far was a 500-mile couple of days in December last year exploring Panamint Valley and Death Valley with my friend Bill Getty, a very knowledgeable guide. Some days I carried the luggage fully loaded; others I removed the saddlebags but kept tire-repair and other tools in the tank bag. We did some of the classic DV adventures like Rhyolite, Titus Canyon, and Racetrack (the dry lakebed where the rocks seem to move by themselves), the Ubehebe Crater, Tea Kettle Junction, and a fun piece of trail called Lippincott Mine Road from Racetrack Road to Saline Valley Road.

And we also explored some of the many mining camps and ghost towns, including the Minnietta Mine (above) and Lookout City, a great ride that ends at this ghost town about 3,500 feet above Panamint Valley's floor. We later stopped at the Ballarat store and headed up Surprise Canyon and into Pinon pine forest on the ridge between Panamint and Death Valley (right) for amazing views and fun riding. The riding in and around Death Valley offers

meadows, forests, an encyclopedia of dirt types, and a lot more water than you'd ever expect. And, of course, plenty of desert.

The WR has also been in the San Bernardino Mountains around Big Bear and into the Sierras south of Yosemite several times; so, well below sea level to more than 10,000 feet, from sixth gear tapped (about 95 mph, probably) to case-bashing rock crawling in first gear with no troubles and all the comfort I desire.

For me, it's not about winning an enduro. It's about *always* making it and not being worn out when I get there. It's also about what the bike does for me mentally: I truly feel like I can ride the WR anywhere and have what I need to survive and thrive in the wild. So even just blasting up the fire roads in our local mountains for a half day of exploring feels like the adventure of a lifetime. —MH





# Service

*BY RAY NIERLICH*



Want extra light at night? Aftermarket LED auxiliary lights will provide the most illumination. Or upgrade your stock bulb with more wattage.

**SHOULD I RETROFIT LEDS?**

**Q:** Are LED headlight bulbs a worthwhile upgrade? Which ones are best? Are they compatible with headlight modulators? I want more light for desert riding at night and would greatly appreciate some advice about the current crop of LED bulbs!

STEVE TATREAU  
ENCINITAS, CA

**A:** It is the Wild West out there in the world of retrofit LED lighting: lots of claims being made but not much proof to back them up. The technology is evolving quickly. LEDs produce a narrow swath of light, so the lens and focal length are critical for good results. They also heat up in operation and require an effective heat sink to survive. You get what you pay for.

At the present, I would still keep your incandescent headlight bulb. Just optimize the situation by fitting a relay if the bike doesn't have one and perhaps a slightly higher-wattage bulb, typically 85-watt for a 55-watt. Then buy some quality auxiliary lights. We have been impressed with the Clearwater lights (clearwaterlights.com)—not inexpensive but well made and in the US. For desert night riding, Clearwater recommends its Krista lights. If those don't scorch the earth well enough for you, upgrade to the Erica lights. They will plug right into the same harness.

**RICH VICTORY**

**Q:** We bought a 2014 Victory Cross Country Custom. Having problems with it running too rich and dying all the time. It has a Power Commander. Does it need to be flashed and retuned, or does it need to be dyno tested?

LORI JOHNSON  
CYCLEWORLD.COM

**A:** Modifications are the first thing to suspect when you're experiencing trouble. Especially since your bike is relatively new and is usually a quite reliable model. Start with the Power Commander. You don't mention why a Power Commander was

installed, what map is in place, or if there are any other modifications. One easy check would be to read the map installed and set it to zeroes versus stock, or you could simply remove the Power Commander completely to check how it runs. Your bike doesn't have to be dyno tested to find out what is wrong, but if it isn't too inconvenient or expensive, have a good dyno guy run it while reading the exhaust with an O2 sensor and mapping it that way. Or install a Dynojet Auto Tune to build the map as you ride.

**KLX ODO WOES**

**Q:** First, I'm proud to say I've been a subscriber since 1968 (the Yamaha DT1 issue!). I've been wrenching on motorcycles since then and can usually fix a mechanical problem. Since this one appears to involve electronics (black magic), I am stumped. I bought a gently used 2004 Kawasaki KLX400S dual-sport (after having spent many miles on its clone, a 2000 Suzuki DR-Z400S). When I got the bike, I noticed the odometer was all goofy. At first I thought the whole unit was off, but the speedometer is spot on, based on comparing with friends and radar speed traps. The odo shows about two-thirds of the actual mileage I rack up. Any ideas how I could get it repaired (Suzuki and Kawasaki want about \$675 for a new one)? The cable and drive are fine. There are occasionally used 400SM speedo assemblies on eBay, but aren't they calibrated differently for the 17-inch front wheel, or do they use a different speedo drive?

ERIC BICKEL  
PENN VALLEY, CA

**A:** Wasn't seeing that DT1 a seminal moment? Like the first time you got kissed by a girl, not your mom. All the inputs for the gauge are from the same speedo drive on the front wheel. If your speed is correct and the odo isn't, the problem is in the gauge. No parts are available.

Dumb question: Do you have the correct display selected? The display should have "ODO" next to the number. If it shows "RT," that's ride time for the last ride displayed. If your gauge really is



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**BASIC SPECS:** Introduced as the KLR600 in 1984 with a displacement bump to 651cc three years later, Kawasaki's KLR has enjoyed amazing longevity. The simplicity of this dual-counterbalancer-equipped, liquid-cooled, DOHC, four-valve, four-stroke single has made this bike appeal to adventurers the world over. Significant performance and styling and comfort updates applied in 2008 reinvigorated Kawi's warhorse, a machine that even served in the US military. A durable double-cradle steel frame, 43mm conventional fork, adjustable Uni-Trak rear suspension, and semi-knobbed bias-ply tires provide good capability on highways and cow trails alike.

**WHY IT'S DESIRABLE:** The adventure bike segment has grown by leaps and bounds over the past decade as riders discover the comfort, convenience, and versatility such motorcycles offer. Unfortunately for some riders, the complexity and resultant cost of many modern ADV bikes has escalated out of reach. Plentiful on the used market, the KLR650 is a refreshing and affordable throwback to an era when roadside repair didn't require computer diagnostics.

**THE COMPETITION:** Other staples of the big dual-sport single scene include the Honda XR650L and Suzuki DR650E, both of which are powered by air-cooled, four-stroke singles. KTM's 690 Enduro R and BMW's F650GS target a more affluent buyer.



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the culprit, forget swapping the original for one from an SM and get yourself a TrailTech Digital gauge ([trailtech.net/digital-gauges](http://trailtech.net/digital-gauges)). All TrailTech gauges replace the original head and sensor.

#### 550-FOUR!

**Q:** I recently inherited a running but out-of-tune 1975 Honda CB550. One of the issues that eats at me is the charging system. The original voltage regulator was faulty, sending 16.1 volts to the battery. I replaced it with an aftermarket regulator/rectifier, which now only sends 12.1 volts to the battery at idle (1,200 rpm) and 12.3 volts at around 4,000 rpm. The resting voltage of the battery is 12.6 volts. I sent the reg/rect back to the manufacturer, who tested it, said it was fine, and returned it to me. I removed the stator and had that tested by an old mechanic friend who told me it appeared to be fine. I checked the resistance figures in the six-gang stator lead, and the results correspond to the values given in my shop manual. I have also checked and cleaned all the wires coming off the ignition switch.

My questions: Are there any other likely culprits to check before inspecting the entire wiring harness? If I should inspect the stator, since I personally didn't, what should I test and look for? Alternately, is there any mechanical risk in riding a bike only charging at 12.1 volts?

MIKE DOBIN  
CYCLEWORLD.COM

**A:** Your bike isn't charging enough to keep up with the load if the measured voltage is below the battery resting voltage. It is running the battery down. All will be swell until the voltage falls below 9 volts or so, and things quit sparking all of a sudden. The CB500 and 550s were great bikes. But one weak point is the charging system. The original charging system will not reach "break even" until above 3,500 rpm. If any additional electrical loads beyond the ignition are added on, such as head- and taillights, turn signals, or brake light, the alternator has no reserve capacity to compensate for these extra loads, at any rpm. Back in the day, when these bikes were used for short trips with lots of restarts or ridden in slow traffic with the headlight on, they would

run the battery dead in short order.

Most bikes have a permanent-magnet alternator with the excess current produced shunted to ground through the regulator. Your bike utilizes an excited-field type of alternator, similar to most automotive alternators. The regulator simply varies the current to a wound exciter coil to vary the output. This coil is located in the center of the alternator cover, with a segmented steel flywheel revolving around it. The stator windings that produce the current for charging are mounted around the OD of the flywheel.

The harness is almost never the problem. It is smart to check the grounds, harness connectors, and battery condition before wasting a bunch of time chasing your tail. Then check the exciter coil with an ohmmeter for an open circuit

## ASK KEVIN

### MODERN PISTON ON OLDER FOUR-STROKES?

**Q:** What is it that prevents a modern piston design from being used in an older model four-stroke with the long full-skirted piston? I have a feeling the stroke has something to do with it and thus rod angularity and thrust. It would be nice to incorporate some of the newer tech into older model big-bore kits to reduce weight and friction.

JEFF SWAN  
PARKVILLE, MO

**A:** Quite a few adventuresome builders have taken this route, but the results have generally been poor. Here's why. The bucket-like pistons of olden times had to be fairly heavy to provide enough heat-conductive metal to carry away the extra heat absorbed by the domed pistons of that time. Their domes could not be made as thin as modern pistons, which in turn could not be cooled without oil jets (think of those 112mm ashtrays in Ducati's Panigale!). So the old-time pistons had to have thick domes to conduct heat outward to the walls, and the thickened region behind the rings then carried that heat down the considerable length of the skirt (tapering as it went) to spread that heat over a large skirt surface area and out to the cylinder wall through the oil film. In other words, those pistons were made that

way in self-defense against heat.

You are right that the mini-skirts of newer pistons would cut friction and weight. Also, the modern arrangement of using very short wristpins in pin bosses that are nothing but short "stalactites" hanging down from the flat, thin piston crown (less reciprocating weight means reduced bearing loads and losses) would do the same.

Another point: Pistons run especially hot in air-cooled cylinders. During World War II, makers of large air-cooled radial piston engines for aircraft had instant problems with ring, piston, and cylinder scoring, plus detonation and piston failure when hostilities began. Why not before? Training aircraft are flown conservatively because who knew when Congress would cough up the bucks for replacements? But when war comes, throttles go to the wall. So a frantic effort to bring down piston temp began—from steel cylinders with integral-machined fine-pitch steel fins, to pressed-on machined-fin aluminum "muffs," to caulked-in thin aluminum sheet-metal fins, set into shallow grooves on the outside of each forged-steel barrel (each B-29 cylinder had 54 of these!).

But air-cooled bikes don't cruise to the target on steady 70-percent power, and this is what made them practical in their time, always slowing for cops and corners.

or a short to ground. Before, when your old points-type regulator was sticking, it might have fried the exciter coil. The good news is that Honda finally realized this malady and came out with an improved, higher-output (more windings of finer wire) exciter coil in 1977 models, which you can fit to your bike. The improved later coil was part number 31101-390-005. The earlier part number was XXXXX-323-XXX. (The 323 is the product code for CB550.) That new voltage regulator may or may not be so good, but now you can check the current (that's amperage plus or minus) at the battery and see.

One last thing: Make sure the brake-light switch, located near the rear brake pedal, isn't sticking on. This is quite common, and the poor thing can't keep up if the brake light is always on. **CW**

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# RaceWatch

*THE VIEW FROM INSIDE THE PADDOCK*



# FEELING THE EDGE

MotoGP has become a game of precise chassis flex and a battle of technical style. Yamaha and Honda are doing it best and doing it differently.

By Kevin Cameron

Y

amaha's YZF-M1 MotoGP bike, on which Jorge Lorenzo gets such fabulous starts and is now leading the Championship, has come far from the original design of 2001.

Yamaha engineers began the new four-stroke MotoGP era by adapting the chassis of its 500cc two-stroke YZR500. It was a loveless marriage. At Motegi in 2003 the engineers were puzzled. An M1 would lap consistently for a time, but then the rider might lose the front end and crash. Sound familiar? Casey Stoner, riding the super-rigid carbon-chassis Ducati had the same experience in 2009-'10: loss of front grip without warning. "Feel" is the warning signals a bike gives you as you near the limit. Ducati had it with the steel-trellis used by Stoner in 2007, and it appears they didn't know what they were giving up with the frame-design switch in '09.

I met a Yamaha chassis engineer at the Yamaha "Media Center" (museum) in Hamamatsu just before Motegi. He pointed

to the two long front engine hangers on Honda's dominant RC211V V5 bike. They could, he said almost wistfully, allow the whole steering head to flex slightly from side to side, acting as a "suspension" at high angles of lean, to keep the front tire gripping on unsmooth pavement.

At the track, I encountered Honda's RC211V project leader, Shogo Kanaumi. He said his company had made many tests to determine how much stiffness is necessary in various directions. He noted that great torsional stiffness is necessary for good handling, but laterally there is benefit in increased flexibility.

Honda had used this in a 2002 crash program to make Colin Edwards' RC-51 Superbike match the corner grip of Troy Bayliss' wallowing trellis-framed Ducati. Edwards had said of the very flexible, visibly weaving Ducatis, "Yeah, they wallow. But they dig in and go around the corner."

This program, applied in steps, eventually gave Edwards the corner grip he needed to win the 2002 title after an epic finale at Imola, Italy.

In May of 2003, Yamaha's engineering

Tuned chassis flex—a big part of Rossi's and Lorenzo's success.







Not that Casey Stoner couldn't ride the stiffer-frame Ducati, but he won less on it.

CHATTER, STABILITY, CHASSIS FLEX, AND ENGINE CHARACTERISTICS ARE MYSTERIOUSLY ENTANGLED. **THERE IS NO TEXTBOOK.**



Rossi sums up his time with Ducati during the 2011-'12 seasons. The 36-year-old has been one of the most adaptable riders ever to race MotoGP.

“fixer,” Masao Furusawa, was put in charge of the M1 program. The prototype he gave Carlos Checa for the post-Valencia test at season's end had the new, long front engine hangers—and he immediately went faster on it. Of this

prototype (the first of four initial test chassis), Furusawa said, “We decreased the lateral stiffness quite considerably while increasing torsional and vertical stiffness just a little. This concept turned out to be a big improvement.”

Motorcycles have very limited tire footprint, so their turning ability is limited. There are two basic approaches to how best to use this ability. One is to minimize what the motorcycle does poorly—turning—and maximize what it does well—accelerate. This is the kernel of what Kenny Roberts took to Europe in 1978, to brake late and hard, get the motorcycle turned early and quickly, and then use the remaining part of the corner as a dragstrip on which to achieve a high exit speed. Roberts' rivals were faster at the apex, but he was faster where it counted—on corner exit. He was 500cc GP champion 1978-'80.

Today's version of Roberts' dirt-track-derived style looks a lot like corner speed, but Ducati's

Preziosi in 2008 cautioned that, “something else is going on.”

That something was Casey Stoner's style of tightening the turning process by dropping down on the tire edges for a limited time to steer with throttle, defining the “point” of what Cal Crutchlow later called “Honda's V-shaped line.” Honda's Marc Marquez rides in similar style.

Yamaha, in its M1, instead chose to maximize tire grip to enable riders to carry maximum speed through corners. With speed higher in-corner, less braking and acceleration were necessary. To maximize grip, suspension spring and damping rates had to be softer to enable tires to track over roughness.

Chassis length was extended to increase stability.

Transitions from braking to turning and from turning to acceleration had to be made with great smoothness—no sudden moves or “yankin' 'er around.”

When Crutchlow rode the Yamaha in 2011 he tried to ride it in Superbike brake/get turned/

go style but he said, "It wouldn't do it. I had to learn to ride it as it was." Hard braking on the soft-sprung Yamaha could bottom the fork, and trying to get it turned quickly was delayed by its longer wheelbase and softer suspension.

MotoGP has become a straight contest between these two contrasting styles. As you'd expect, the "Honda way" works best on stop-and-go tracks, and "Yamaha's way" can excel on flowing tracks and longer corners.

As tires evolve, chassis must evolve. When Michelin brought a big new rear tire in 2006, it set every chassis to chattering. The usual emergency fixes (like lead-filled axles to tune out certain flex frequencies) worked for Honda but not for Yamaha. Valentino Rossi was stopped by chatter for four races, and only reverting to the 2005 chassis enabled recovery. Chatter, stability, chassis flex, and engine



characteristics are mysteriously entangled. There is no textbook. The '06 championship was lost.

In 2007, the problem was Casey Stoner on the 800cc Ducati with

revolutionary Bridgestone tires. When Rossi switched to Bridgestones, weight had to be shifted rearward on the Yamaha and its center of mass raised to transfer

Marc Marquez has shown fallibility this season but remains a dominant force in the championship.

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weight forward quickly on braking. Yamaha's 2008 chassis' lateral stiffness cut another 10 percent (making it now just two-thirds as stiff as the 2004 baseline), and with refined electronics and Bridgestone tires Yamaha riders dominated 2008–2010.

In 2012, engine size jumped from 800cc to 1,000cc. M1s were now run with their rear axles at their long limit to minimize wheelies and exploit the bigger engine's greater torque. A longer swingarm arrived. Chassis beams were reduced in cross-section, especially just above the swingarm pivot.

Photos of the most recent M1 chassis show that the former "Deltabox" structure of separate side beams, engine hangers, and hanger struts has blended into a triangular "big web" on each side, billowing out like Batman's cape to clear the engine's cylinder head, with an apex attaching

low on the front of the engine as before. Some have speculated that the "Batman cape" is machined from solid to precisely control its dimensions. This chassis seeks to better combine the necessary lateral flexibility with the bending and torsional stiffness required to resist braking force without upsetting steer effects.

In 2013 began the reign of Marc Marquez on Honda, the duration of which is unknown to us. Riders asked for increased braking stability (a particular Honda strength) and more in-corner grip.

Tires changed again. Yamaha lost ground when Bridgestone in 2014 brought faster-warming tires that also had slightly reduced edge grip. Edge grip is basic to the modified corner-speed riding styles being evolved by both Lorenzo and Rossi and built into the long-and-low Yamahas. But both riders are having to reduce their time on the tire edges because

the Honda, plus Marquez's mastery of tire management, often add up to Marquez having more tire left at the end—as he clearly did at Indianapolis. Lorenzo has a substantial championship lead as the second half of the season moves to tracks that notionally favor the Yamahas.

No chassis can be perfect—just better or worse. Motorcycle roadracing might have once been a noble contest of engine power and durability, but with engine development now frozen in-season it has become a struggle to produce chassis properties that riders can use to race hard all the way to the last lap. Chassis and suspension function as a filter system, softening or stopping inputs that fatigue the tires, letting through inputs that riders need to know where the edge is. Understanding is taking time but will one day benefit all motorcycles. *CW*

EDGE GRIP IS BASIC TO THE MODIFIED CORNER-SPEED RIDING STYLES BEING EVOLVED BY BOTH LORENZO AND ROSSI AND BUILT INTO THE LONG-AND-LOW YAMAHAS.





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LOT 62434 62426  
LOT 62433 62428  
LOT 62432 62429 shown

13889159

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LOT 69252/68053/62160 62496/62516/60569 shown

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**32 PIECE SCREWDRIVER SET**

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LOT 61259 90764 shown

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LOT 67847 shown 61454/61693/62803

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LOT 46319 shown 61160/61896

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**1000 LB. CAPACITY MOTORCYCLE LIFT**

• Height Range: 7" - 30"

LOT 69904 68892 shown

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LOT 33497 60604 shown

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**MOTORCYCLE STAND/WHEEL CHOCK**

**PITTSBURGH**

• 1800 lb. Capacity

LOT 61670/97841 shown

**SAVE 46%**

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**MICROFIBER CLEANING CLOTHS**

**PACK OF 4**

LOT 68440 69678 shown

**SAVE 66%**

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**WIRELESS SECURITY ALERT SYSTEM**

**Bunker Hill Security**

LOT 93068 shown 69590/61910/62447

**SAVE 60%**

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**1500 LB. CAPACITY MOTORCYCLE LIFT**  
PITTSBURGH  
LOT 69995 shown  
60536/61632

**AWARD WINNING QUALITY**

**SAVE \$80**

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**1/2" INDUSTRIAL QUALITY SUPER HIGH TORQUE IMPACT WRENCH**  
CENTRAL ELECTRIC  
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68424 shown

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**9 PIECE FULLY POLISHED COMBINATION WRENCH SETS**  
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LOT 69043/42304 shown

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**WITH ANY PURCHASE**

**3-1/2" SUPER BRIGHT NINE LED ALUMINUM FLASHLIGHT**  
LOT 69052 shown  
69111/62522 62573

**\$699**  
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**RETRACTABLE AIR HOSE REEL WITH 3/8" x 50 FT. HOSE**  
CENTRAL PNEUMATIC  
LOT 69265/62344  
93897 shown

**SAVE \$90**

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**4 PIECE ANTI-FATIGUE FOAM MAT SET**  
LOT 61607/62389  
94635 shown

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LOT 47257 shown  
61585/62387

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**44" 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET**  
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69387/62270/62591

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**SAVE \$330**

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## WOW SUPER COUPON

**MOTORCYCLE WHEEL CHOCK**  
PITTSBURGH  
LOT 60392  
69026 shown

**SAVE 40%**

**\$2999**  
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**45 WATT SOLAR PANEL KIT**  
LOT 62443  
68751 shown

**THUNDERBOLT solar**

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**LOW PROFILE MOTORCYCLE DOLLY**  
LOT 95896

**1250 lb. Capacity**

**SAVE \$45**

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LOT 67151

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Subject to terms, conditions, availability and qualifications. New Motorcycle Replacement is an optional coverage. Claims will be settled based on customer choice to obtain original equipment manufacturer parts for their bike make and model. Actual savings will vary and may depend on coverages selected. Allstate Indemnity Company, Allstate Property and Casualty Insurance Company, Northbrook, IL and Allstate New Jersey Property and Casualty Insurance Company, Bridgewater, NJ. © 2014 Allstate Insurance Company